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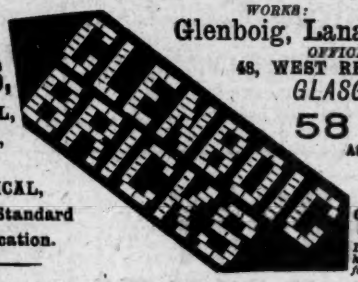

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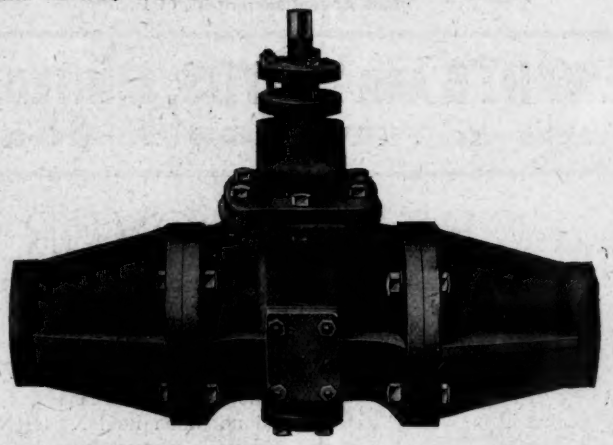

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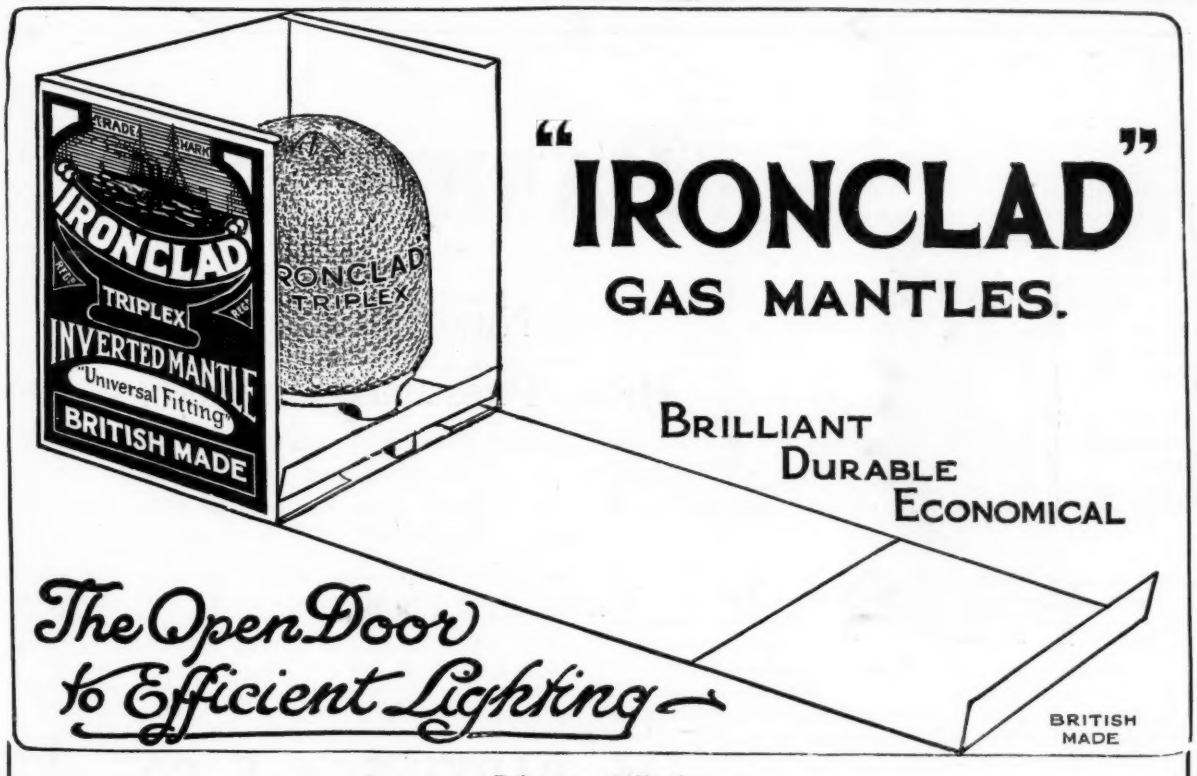

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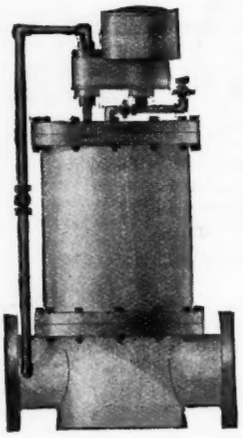

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VOL. CLIX., No. 3098.] WEDNESDAY, SEPTEMBER 27, 1922. [74TH YEAR.

EDITORIAL NOTES.

No Decision as to a "Therm" Inquiry.

DURING the gas account agitation, in which the guileless "therm" has had all manner of evil things said against it by the uninstructed as being an infamous instrument in the dealings of the gas industry with consumers, the "Daily "Mail" has not accorded publication to some of the letters sent to it from members of the gas industry; in one report of an address by a member of the industry a statement was inserted which, it is quite manifest to those who know him, could not have been uttered by him, but the public would not be aware of this; and the paper has also promulgated other inaccuracies in regard to the question. Last Wednesday, this (in respect of the particular matter in hand) unreliable and pragmatic contemporary stated that "acting "on the advice frequently given by the 'Daily Mail' [!], "the Slough (Buckinghamshire) Urban District Council has "decided to ask the Board of Trade to hold an inquiry into "the therm system of charging for gas." The following morning this announcement appeared in the paper: "Therm "Inquiry to be Held—Government Decision—The Board "of Trade, the 'Daily Mail' is informed, is willing to "accede to the request of the Slough, Buckinghamshire, "Urban District Council, to hold an inquiry into the new "system of charging for gas by therms, or heat units, "instead of by the 1000 c.ft. The inquiry will probably "take place in London, and will be held without any delay." The same day the "Evening Standard" stated: "The re-"port that the Slough (Buckinghamshire) Urban District "Council have asked the Board of Trade for an inquiry "into the system of charging for gas by therms was denied "this morning. 'We have had no request from Slough for "an inquiry,' said a Board of Trade official to-day, 'and "there has therefore been no decision.'" On Friday, the "JOURNAL" was authorized by the Director of Gas Administration (Mr. H. C. Honey) to deny that any such decision as that referred to in the "Daily Mail" article has been come to by the Board of Trade. If a demand for an inquiry is made by the Slough Council, naturally the Board of Trade will consider the facts placed before them, and will then, and not till then, come to a decision as to whether or not any action shall be taken.

An "Engineering Correspondent" and Prof. Smithells on the Therm.

AFTER the avalanche of invective to which the gas industry has been subjected in the public Press, and the attacks to which some of its men, organizations, and papers have been exposed with an insensate clatter that has once again demonstrated that "a dog's bark may be worse than its "bite," it is refreshing to turn to the "Yorkshire Post" and read diametrically contrary views on the matter—views provided by intelligence, and not the absurdity that has lately been witnessed. The Engineering Correspondent of the "Yorkshire Post," in an article published on the 15th inst., examines the matter of the therm basis of charging in relation to the controversy on high gas accounts; and he does so in a manner which the man in the street cannot fail to understand, and which should give abundant assurance, wherever the paper circulates, that the gas industry is not indulging in any trickery in this regard, but is simply adopting a statutory change made solely in the interests of the gas consumers. The fact that it is in the interests of the consumers is really the predominant reason that it is in the interests of gas undertakings; for, actually, the therm system entails a weightier responsibility upon gas suppliers than the former conditions of supply.

The value of the article by "Engineering Correspondent" lies in the fact that its very tenour shows that the writer is perfectly disinterested, and competent to view the matter without any bias, and solely upon its merits. His emphatic declaration is that the cost of gas is no more to the consumer paid for by the therm than if paid for per 1000 c.ft.; and he finds that payment by calorific value is in several ways more satisfactory and rational than payment by volume—in view of the use of gas being practically limited to heating purposes. He does not deny that the price is high relatively to pre-war times, but not higher than most other commodities, when contrasted with what has been. Some people have fantastic notions regarding the extent of the increased charges for gas. Take a 500 B.Th.U. gas which before the war was selling at 2s. 6d. per 1000 c.ft. (or 6d. per therm), and is now selling at 10d. per therm (or 4s. 2d. per 1000 c.ft.), the increase is only about 66 p.ct.; and yet some gas undertakings are paying an additional 100 p.ct. and more for coal, while the market values of secondary products are at a very low level. The average cost of living index figure is above 80 p.ct. for the past three months. However, the "Engi-"neering Correspondent" says the public are not being "done" when asked to pay by the therm; and in this he is, of course, absolutely correct, seeing that it matters very little (within reasonable limits) what the calorific value of a cubic foot is now so long as the consumer is charged by the therm. We have defended the therm system as we heartily believe in it; but because we do this, and do not hold with making what would be foolish flights in the gas-manufacturing circumstances of the times, there are inflamed imaginations that run riot with facts—imaginations that think we are opposed to the making of the greatest number of therms out of a ton of coal. Of course we are not, if propriety, which means efficiency and economy, in any particular case and at any time, gives sanction. But we are not going to subscribe to the universality of any such propriety at the present day, nor are we prepared to submit that the judgments of the professional men of the gas industry, in existing conditions or at any time, should be subservient to the view of any one man, though (as has been the case in the past) the trend may be towards lower thermal values per cubic foot.

We are also charged with defending the therm, when the public desires the cubic foot. The gas-consuming public has tremendous proportions—proportions of such magnitude that we cannot accept the screechings of a few newspapers and a relatively few (relative to the number of consumers) complaints of the ascent of gas accounts as being in any way representative of a universal public desire. But while we are so arraigned for doing something which we believe shows quite a decent amount of sanity on our part, we remember with some amusement that not-long-since much-heralded epigram—"One B.Th.U. is as good as another." Never have we seen an assertion that "one cubic foot of gas "is as good as another." Cubic feet have been known to cover a multitude of sins. Admitting that "one B.Th.U. is as good "as another," and that cubic feet cannot make the same claim, then in the B.Th.U. the gas industry has the soundest possible basis upon which to charge its customers—a basis sounder by far than cubic feet.

This is a digression. We were talking of the intelligent article that appeared in the "Yorkshire Post" from its "Engineering Correspondent." That article induced Prof. Arthur Smithells, Professor of Chemistry in the Leeds University, to write a letter to our contemporary, which is

reproduced in the news columns of the "JOURNAL" to day. That letter is an outspoken defence, in the interests of the public, of the system of charging by the therm. Prof. Smithells is an authority second to none on the subject of the combustion and utilization of gases. We say this not for the information of readers in the gas profession, but of those who are not of the gas industry, but who read our articles for information. The whole of the letter is interesting; but there are two or three matters in it that are peculiarly so. One of them is this: "I took part in the pro- "ceedings relating to the introduction of this new system of "measurement, being one of a small group of men who met "occasionally in private conference under the leadership of "the late Lord Moulton during the critical days of the war. "I commit myself without the least hesitation to the posi- "tive statement that the change which has been made was "designed to the public advantage." It should perhaps be explained that the private conferences to which Prof. Smithells refers were not specially convened for the purpose of considering the question of converting the basis of charge for gas from volume to a heat-unit basis. The conferences (which were held when war supplies were running out, and the gas industry was straining itself to supply every ounce of raw material for explosives) were dominated by the consideration of national fuel economy, and the right system of payment for gas was only incidental to the capital consideration. As to the part that Prof. Smithells took in the matter of the introduction of the therm system, he is rather afraid that the letter may seem to indicate a claim to an important part, but he wishes to correct any such inference. That is hardly necessary. We all know Prof. Smithells; and we realize the fact that he did what he could, and it will not be wrong to say somewhat more than appeared on the surface. It is satisfactory to know that his views of that day have not been altered in the slightest—not even by the ill-informed writings in the public Press, nor by the controversy that has been raging over the subject of gas accounts. We repeat his expressive declaration: "I commit myself, without the "least hesitation, to the positive statement that the change "which has been made was designed to the public advant- "age." We will add to that—it is to the public advantage, and will continue to be. As the Editor of the "Yorkshire "Post" well and tersely puts it, "where the therm is in "use, the gas bills will be calculated in the fullest con- "formity with the good business principle of requiring pay- "ment only for actual value given and received."

In explanation of the agitation, we are afraid there is a great deal of truth in an incident (related by Prof. Smithells) of the discussions respecting the proposed change. A prescient member of the gas industry then said that the chief danger of the new system would be that it was "new;" and this would inevitably be seized as a weapon by ill-informed or unscrupulous people who, for any cause whatever, wished to assail the gas industry. But he confesses that not one of them foresaw the extent to which the truth would be perverted, or how perfectly the therm would subserve the purpose of that particular form of commercial enterprise known as a newspaper "stunt"—a form of "enterprise" that has not, by the way, been confined to the public Press. Even had they foreseen what was going to occur, it would not have acted (this we are glad to learn) as a deterrent to those who believe that the new system is the correct one. If the obscurants were allowed to prevail when anything "new" came along, then forsooth progress would never be made. In the therm the gas industry has something that has basic soundness, and which, when universally applied to gas supply (as we hope it will be), will enable exact comparisons to be made all along the line of production and distribution costs, as well as selling prices. And as between one gas-supply district and another, consumers will be able to judge gas prices on the basis of value delivered and received.

Is a Coal Shortage in Sight?

THIS is rather a startling question for the responsible men of an industry using round about 20 million tons of coal a year. The question is asked because in the "Evening Standard" last Friday there were published some extracts from a lecture by Sir Richard A. S. Redmayne, K.C.B., who was Chief Inspector of Mines from 1908 to 1920. At the top of those extracts, the question was put: Is a coal famine in sight? There is not much in the extracts themselves to supply an answer to the question, other than the assertion of Sir Richard that "were trade conditions to become normal, the "world would be face to face with a coal famine." We all hope that trade conditions will improve, and become normal; but the prospect of a state of trade normality being accompanied by a shortage of coal is not by any means a pleasant prospect. Yet this is what Sir Richard asserts we have to contemplate. It will be noticed that he says the "world" would be face to face with a coal famine. But what the "world" suffers, this country would share in. Supposing home trade reached the highest level yet attained, there would be, at the present rate of output of coal, plenty for this country; but the surplus available for export would be curtailed. Such a condition of things would be to the economic disadvantage of the country generally and to the coal industry in particular. Coal exports are again ascending, apart from the adventitious requirements of the United States and Canada; and the coal industry is naturally desirous of seeing this condition of things maintained, and not diminished.

Before the war, there was enough coal for home requirements and to spare for export. But at the present rate of output, we should not be able to export up to the level of (say) 1913, *plus* the requirements for coaling ships, and still have the remainder that we had for home use in the year named. Sir Richard Redmayne attributes much of the deficiency in output (having regard to the number of workers employed) that is experienced to-day to the reduction to seven per day of the working hours of the miners. In the "JOURNAL" for May 31, a paragraph appeared [p. 497] which showed that there has been just about a proportionate reduction of output to diminution of time worked, and that the best to which we can look forward is a lessened output, compared with 1913, of about 37 million tons of coal. If the conditions of home trade and foreign business required an output of 287·4 million tons in 1913, and the output that can be expected to-day is 250 million tons a year, then trade revival and coal export business would leave us with a deplorable deficiency, which would bring the law of supply and demand into play with a vigour that would be to the serious disadvantage of home consumers. The indications are that the output per worker this year will be roughly about 36 tons below that of 1913, which, multiplied by over 1 million workers, gives approximately the deficiency (taking the 1913 figures) in annual output mentioned above. Quoting from our issue of May 31 last, the number of workers in the week ending April 1 was about 1,080,000, and the output per worker during that week was 4·46 tons, or at the rate of only 223 tons a year. In 1913, with the eight-hour shift in operation, the annual output per worker was 259 tons. Even when demand warrants the employment of the same number of workers as in 1913—1,110,884—the annual production will still be only 87·5 p.ct. of the 1913 output of 287·4 million tons, or roundly 250 million tons.

That is the position, and it is one of extreme gravity. In the extracts from Sir Richard's lecture, as published in the "Evening Standard," the data given above did not appear; but it is quite evident that, in the opinion of this high mining authority, the situation and the outlook are not such as to induce comfortable reflections. He considers the means for improvement, without touching the (according to the miners' leaders) inviolable seven-hour day. He dismisses as worthless for improvement all such measures as nationalization, State control, or participation by the workers in the control of the industry. Something might be done in the way of speeding-up by a wider application of mechanical appliances to the cutting and the transport of coal in the mines; but in the mines of this country, these aids to betterment in output cannot be utilized to anything like the extent that some people imagine. Mechanical coal-cutters cannot be employed in all seams and for all classes of coal. Still they might be adopted to a substantially larger extent than now. Then additional improvement might be effected by increasing the means of mechanical transport underground of the men to and from the working faces. Absenteeism might be reduced, and the multiple-shift system be applied for increasing output. The grouping of mines is a policy that has been growing, and is on the increase with financial advantage. If—and this is an "if" that can be emphasized with the miners antagonistic to most of the proposals—all these things could be applied, then the increased output would lower costs. But home coal consumers would not experience any tangible effect from the lower costs if there was still a shortage of output when trade reached a normal state, and inland and overseas demand for coal rose even to

the level that warranted an output of between 287 and 288 million tons in 1913. The law of supply and demand would come into operation; and the consumer would have to pay.

Calorific Power Indicators for the Works.

CHANGE brings new requirement. The transfer of the manufacturing work and trading operations of the gas industry from volume to the heat-unit basis has brought in its train several new considerations and needs. Among the latter is a simple method of approximately indicating calorific power on the works, and the other is a meter which will register therms, or therms and cubic feet. In respect of the meter, attention was recently directed in a paragraph [see "JOURNAL," Aug. 30, p. 465] to work that is proceeding in connection with the devising of a therm-registering meter; and just now we will say no more on that point. But as to an instrument to indicate approximately thermal value on the works, inventors appear to be busy in different parts of the world where the science of gas combustion (as known to-day) is applied to the many problems that arise in connection with gas production and utilization. The South Metropolitan Gas Company were among the first to realize the need for a calorific power indicator which should be of such simplicity in form and use that the works foremen could promptly ascertain and record what was going on. It was nearly two years ago that Mr. E. V. Evans, chief of the Company's Chemical Department, raised our expectations that the *desiderâtum* had been actually accomplished, and that the equivalent (other than in structural simplicity) of the jet photometer was about to be presented to the industry. To the new-born the name of the "Calori-"scope" had been given. But early last year, Mr. Evans damped the expectations as to the instrument being one which could be applied to all compositions of gas, by a letter to the "JOURNAL" in which he frankly confessed that, "as a result of continued work, we have arrived at the con-"clusion that the instrument described in the columns of "the 'JOURNAL' cannot be recommended for determining "the calorific value of gases other than of straight coal "gas."

Since then it has been seen that workers in other countries have been directing their attention to the devising of instruments which they hope will prove to be the solution of the problem. We profoundly wish every one of them the utmost success. They all deserve it; but the probability is that—as will no doubt be the case in respect of the recording calorimeter—one will succeed in satisfying requirements (which comprehend a considerable diversity of gas compositions and values) somewhat more than the others. That will be the one (when it is satisfactorily proved that it has arrived) which will meet with the most general acceptance. In other words, the fittest will survive. Just lately [Aug. 9, p. 322], we published a translation of a paper, read before the Société Technique du Gaz, by M. Grebel, in which he described a new gas quality indicator that he, in collaboration with M. Velter, has invented. Still more recently [Sept. 6, p. 532], in the "Register of Patents," some extracts from a patent specification were given which show that Mr. E. R. Lanphier, of Toronto, has been working on much the same lines, though with essential differences in method. In both the French and the Canadian inventions, the cones of bunsen flames play an important part. In the Grebel-Velter indicator, two burners are used, in one of which the gas is subjected to medium aeration and in the other to slight aeration. In the conclusion to his paper, M. Grebel said that, by noting the appearance of two gas-flames so aerated, gas engineers would be able to keep continuous control over the gas they distributed. Based in principle on an essential characteristic of combustible gases—the speed of flame propagation—by the measurement of the heights of the internal cones, the instrument, once calibrated, would show what modifications of composition were necessary to satisfy the consumers, and to keep the product within the prescribed regulations of supply. On the other hand, Mr. Lanphier uses one burner; but alternately in it two gases—one which he calls the standard or laboratory gas, while the other is the ordinary commercial gas. When the laboratory gas is introduced, the burner is adjusted so that the yellow tip in the inner cone of the flame will just disappear—the parts of the burner which are provided with graduations, indicating standard thermal units, having been previously set to correspond to the laboratory gas. On the commercial gas being introduced, the graduated portion of the burner is adjusted until the luminous tip disappears. The reading of the graduations on the burner will then indicate the calorific value of the gas being tested. This is illustrated by examples in the extracts from the patent specification as published in these columns on the 6th inst. What, however, is wanted for works' use is something which will show at a glance, without special manipulation, what is happening in respect of calorific value.

We will not enter in detail into the proposals of the inventors; and, of course, it is impossible, in present circumstances, to assign any superior merit to the one instrument over the other. Experiment and experience are alone the avenues by which this can be done. Therefore, we must wait for further information.

Gas Workers' Wages.

There will be no alteration in gas-workers' wages during the coming three months. The cost of living index figures from June to August, as published in the "Labour Gazette," were 84, 81, and 79—making an average of 81·33. This does not represent a fall of seven points below the new basic figure of 86. Hence the continuation for the next three months of the present rates of wages.

Electricity Charges.

The "Daily Mail" and the "Pall Mall Gazette" were the two principal papers concerned in the high-gas-account-*cum*-therm agitation. The "Evening Standard" seems to be willing to undertake a similar campaign on behalf of electricity users. It appears to have discovered a considerable difference between the charges of municipal electricity concerns and of companies. Our contemporary announces: "If householders whose electric light is supplied by private companies wish to see the charge reduced to 5d. per unit—the new rate in the St. Pancras Metropolitan Borough—they can assist by supplying actual charges for recent company accounts." Apparently this is the only way the "Evening Standard" believes the facts of the position in regard to electricity charges can be ascertained. It has evidently been studying the London County Council report on Metropolitan electricity supply for the year 1919-20—the latest to hand—but it cannot find anything there of a satisfactory nature. What it has discovered is such a complicated mass of tariffs for electricity supply that it is impossible to get a true line of comparison with flat-rate charges. Particulars of actual charges would, in its opinion, be of great value. Of course, the position is altogether different from that of gas, which is commonly used for a variety of purposes in the household, while electricity, with rare exceptions, is employed for lighting only.

The Fixation of Nitrogen.

This is a matter that can be regarded from different standpoints. The Government should—if they do not—look upon it from the point of view of national defence; the carbonizing industries, as ammonia producers, scrutinize the position with some amount of uncertainty from the point of view as to the effect it will have in the times of peace upon their sulphate of ammonia market. Perhaps they ought patriotically to take the larger view, which comprises all aspects. One of the most interesting papers read at the British Association meeting was by Dr. J. A. Harker, on the "Post-War Progress in the Fixation of Nitrogen." He showed, in the course of it, the enormous strides that Germany is making in the production of nitrogen, which will be available for explosives making or for fertilizer production just as desired. It will be remembered that the extensive Oppau works of the Badische Company were practically destroyed twelve months ago by a great explosion; but it is learned that they have now been restored at an immense cost, though money cannot be readily found for other "reparation" purposes. It is estimated that at the end of this year, Germany will have at her disposal an internal capacity for the production of about 500,000 tons of synthetic ammonia annually. This will assure her of all the basic materials for a gigantic production of munitions, together with enough fertilizers to enable her to grow a very large part of her food. Germany in the late war found the need for being, as far as possible, self-contained. The lesson has not been lost upon her, if it has been upon other countries. While Dr. Harker warned this country of the position in this matter so far as it

relates to Germany, in a subsequent interview he mentioned that, when completed, the works on the Tees that Messrs. Brunner, Mond, & Co. purchased from the Ministry of Munitions in their incomplete state would have a capacity exceeding that of the Oppau works. The paper mentioned the various processes—including the Claude—for the making of synthetic ammonia; and this and other contributions described the work that has been done in the production of cheap hydrogen, which is of paramount importance in the process of manufacturing synthetic ammonia. Much has also been heard of cyanamide as a fertilizer; but Dr. Harker does not appear to think a great deal of it.

Synthetic Nitrogen Products.

A paragraph full of interest, and bearing upon the British Association papers, appears in the periodical circular of Messrs. Aikman (London), Ltd. It refers to the increasing costs of synthetic nitrogen products in Germany. One is inclined to be a little dubious over such reports—not, of course, questioning the fact of the increase, but in the current financial circumstances of the country it is impossible to gauge the exact position, or whether the change in price is likely to have any durability. However, this is what the report says: Increasing costs have resulted in the German inland price for synthetic nitrogen products being raised early this month by 180 p.ct.—the new prices fixed being for nitrate of soda 292 marks per unit of nitrogen per 100 kilos against 108·6 marks; for sulphate of ammonia, 242·2 marks, against 90·2 marks; and for cyanamide, 215·6 marks, against 80·4 marks. The time when Chilian nitrate can compete in Germany would therefore appear to be nearer. Negotiations still continue for the purchase of Chilian nitrate by Germany; but as it is not required until the turn of the year, sales on a large scale are likely to be delayed for some months. In the meantime, a few thousand tons are reported to have been bought in exchange for sulphate of ammonia.

Sulphate of Ammonia Exports.

The exports of sulphate of ammonia from this country in August nearly doubled the shipments for August, 1921. The quantity was 14,649 tons, compared with 7549 tons in August last year. But the larger quantity last month only had a value of some £4000 more than the quantity in August, 1921—the figures being £88,748, as compared with £84,887. This shows the heavy fall in prices for sales abroad. France took 2933 tons; in August last year they were not buyers. The other large buyers were Spain and the Canary Islands and the British West Indies. There was a heavy drop in the quantity disposed of to the Dutch East Indies.

Gas Coal Position.

From the different coal-fields, the market reports are unanimous on the point that the home demand for gas coal is improving. This is attributed to three causes: Heavier contracting, the seasonal increase in the demand for gas, and stocking for winter. This being so, there is a little more firmness in prices—particularly up North. In some areas it is said that there is but a small amount of gas coal available for the open market; but Yorkshire does not subscribe to this. From that district, it is reported that, though improvement in demand is being felt, supplies are quite plentiful.

Gas Coal Exports.

August was another good month for the export coal trade. The quantity shipped (excluding bunkers, coke, and patent fuel) was 6,146,121 tons, compared with 3,103,207 tons in August, 1921, and 1,847,403 tons in August, 1920. The total value of the coal shipped last month was £6,873,551. Of the total exported last month, gas coal accounts for 882,531 tons; the value being £944,636—an average per ton of £1 1s. 4·9d. In August last year, 599,836 tons were shipped; the value being £1,132,327. In the same month of 1920, the quantity was 190,490 tons; and the value £766,016. During the eight months to the end of August this year, 5,457,208 tons of gas coal were shipped, with a value attached of £5,983,436.

Gas Coke Shipments.

The shipments of gas coke in August amounted to 92,171 tons; the value being £125,007—an average per ton of £1 7s. 1·5d. In August last year (following the coal stoppage), the exports of gas coke only amounted to 20,626 tons, with a value of £28,438. The shipments in August, 1920, were 112,818 tons; the value being £887,744. The amount of gas coke exported in the past eight months was 474,212 tons; the value being £688,164. In the corresponding period of 1921, the quantity was 239,913 tons; and the value £592,800. In the like period of 1920, the quantity exported was 558,093 tons; and the value was no less than £3,250,134! Unprecedented were those times for gas coke sent abroad.

PERSONAL.

Sir JAMES DEWAR, who has now entered upon his eightieth year, has to his credit a long record of valuable work. He has held for somewhere approaching half-a-century both the Chair of Natural Philosophy at Cambridge University and the Professorship of Chemistry at the Royal Institution.

There was a good attendance of friends of Mr. E. FROST, the Manager of the Churnet Valley Gas-Works, to bid him adieu on his leaving the district to take up an appointment at Whetstone, Leicestershire. Mr. J. H. Lister, who presided, paid a great compliment to the tact and ability of Mr. Frost, to whom Mr. E. Byatt then handed a handsome oak cabinet of cutlery, and a silver-mounted briar pipe, pouch, and tobacco. In doing so, he said Mr. Frost had been a most invaluable servant to the Company in every possible way. They all regretted his leaving the district, but were pleased to know that he was attaining further success in his new appointment. On behalf of his many friends, he had pleasure in asking Mr. Frost to accept the presents, wishing him and his wife and family every happiness in the future. Mr. E. Rushton, on behalf of the staff and workmen, also paid many compliments to Mr. Frost. Briefly acknowledging the presents, Mr. Frost said he should always look back with happiness to the occasion, and should never forget the generosity of the friends he had made in the district.

Failing health, and the death of his wife while with him on holiday recently, have impelled Mr. B. BROADBENT, of the fitting department of the York Gas Company, to relinquish his position and go to reside at Shoeburyness. In the department last week, Mr. Broadbent, who has been with the Gas Company 28 years, was presented with a half-hunter gold watch, a pipe, and tobacco pouch by the workers in the department, as a token of their regard and sympathy; and speakers expressed the hope that he would have many years of good health in his new home. The presentation was made by Mr. Thos. Pinder, one of the oldest workmen in the Company's employment.

Mr. A. JONES having relinquished the office of Secretary to the Wolverhampton Gas Company, the Directors, in recognition of his invaluable services during the past 58 years, have appointed him to fill the vacancy on the Board caused by the death of the late Lieut.-Col. H. H. Ward. Mr. Jones entered the Company's service in 1864, and has thus been identified closely with it for more than half its existence. Those who have had the privilege of working with him know how largely he has contributed to the development and success of the undertaking. It is the Board's sincere wish, in which the officials join, that Mr. Jones in his new capacity may continue for many years to give the Company the benefit of his wide experience and sound judgment, and also that he may enjoy his increased leisure in the best of health.

OBITUARY.

We are sorry to learn of the death, on the 19th inst. at Cliftonville, of Mrs. ELIZABETH R. WILTON. The deceased lady, who was only 30 years of age, was the wife of Mr. Thomas O. Wilton (of the Chemical Engineering and Wilton's Patent Furnace Company, Ltd.), to whom our deepest sympathy is extended in his bereavement.

Koppers Ovens at Clairton.

A contract has been secured by the Koppers Company to build 366 bye-product ovens of their new design for the Carnegie Steel Company at Clairton (Pa.). These ovens will be of the combination type, so arranged that they may be heated with producer gas or blast-furnace gas, releasing all the coke-oven gas for use in the mills. Mr. Joseph Becker, the Consulting Engineer to the Koppers Company, is the inventor of the new oven, and an experimental battery of this design has been in operation at the Company's Chicago plant for the past year. The principal advantages claimed for the new design are an improvement in the quality of the coke produced, making possible much more economical blast-furnace practice by reducing the consumption of coke per ton of iron; a faster coking time, giving a greater capacity per oven per day; and stronger construction. This addition will increase the carbonizing capacity of the Clairton bye-product coking plant by 8500 tons of coal per day, bringing it up to a total of 21,500 tons daily. The present plant is stated to be already the largest of its kind in the world. The original installation, consisting of ten batteries of 64 ovens each, was completed in 1917, and in the following year another two similar batteries were put down. The present addition of 366 ovens brings the total up to 1134, all of which will have been designed and built by the Koppers Company.

ELECTRICITY SUPPLY MEMORANDA.

IT is submitted by certain electrical men that the science of salesmanship in the electricity industry has not been developed to the same extent as it has been in other industries and trades.

The Science of Salesmanship.

If this be so, then the enormous amount of effort and published matter on the subject have very sadly miscarried. But perhaps the statement is right as to the "science" of salesmanship, because the amount of misrepresentation of a competing agent that has had currency over a long period in some quarters of the electricity industry in order to develop business cannot be properly classified as anything in the nature of a "science." It would be a gross misuse of the term. Newcastle is making a move in attempting to cultivate the "science." It is recognized that enlarged sales are of paramount importance; and, with the view to increasing the interest in sales throughout all grades of employers and employees, and in order to encourage the whole industry to help to create electrical sales and an atmosphere, it is proposed to hold a series of salesmanship conferences in Newcastle similar to those held in London last winter. The statement indicates that in the electrical industry there is a vast amount of spade work to be done. It suggests that employers and employees in the industry are suffering from a great lethargy in the matter of salesmanship. But the inferences that can be drawn from the statement are not exactly true. The interest has been there, but not the material encouragement. A great number have put forth good effort in domestic electrification, but the permanent reward has not been of a character to maintain interest at any high level. Many men in the electricity supply industry make the mistake of assuming that what has been done in one place can be accomplished in another. No allowances are made for the differences in the characteristics of districts. Initial success in a favourable area —though the rate of achievement is not maintained after novelty has worn off and experience has made a proper valuation of service—is taken to have an application here, there, and everywhere; and the results show that experience in one area will not fit another. We have noted this often. Results have been highly encouraging at the start, and there has been enthusiasm. But later on there comes the confession that the rate of increase has slowed-down; and there are cases where the number of electric cooking-stoves has remained almost stationary. We have heard, too, of cases in which electric radiators have been let on hire, and the number of "returns" has about equalled the number of new connections.

Proposals for the Conferences.

However, regarding the contemplated conferences in the Newcastle area, it is felt that at the outset, the greatest benefit will accrue from considering the problem with the main object of creating a demand among, and selling to, the ultimate buyers. There does not seem to be anything very novel about this initial intention. However, in view of the plans for salesman conferences in the gas industry, it may be of interest to quote the proposals for the conferences of electric salesmen in the Newcastle area. Here they are: (1) To hold the conferences once a month at which encouragement to free and open discussion will be given to all members of the electrical industry who may care to attend. (2) At each conference to have a competent speaker to introduce a subject which will subsequently be discussed by others present. (3) To make the conference as informal as possible, but at the same time to keep discussion strictly to the subject in hand. (4) The opening meeting will be addressed by Mr. J. W. Beauchamp, Director of the Electrical Development Association, who will speak upon "Mutual Salescraft Study." Other speakers on other subjects are now being arranged for. (5) Detailed arrangements are in the hands of an Executive Committee, who are making the plans for successfully running the conferences. Supplementing this it is said that emphasis must be laid on the point that it is desired to encourage the selling idea throughout the whole industry, and that employers and principals should endeavour to interest their employees in the conferences. "Employees so frequently have opportunities of promoting sales if they realized the necessity and value of doing so, and were equipped with the necessary knowledge and desire, and 'the selling idea.'"

Cooking Conditions Not Universally the Same.

"Pot Boiler's" letter in "Electrical Industries" (to which allusion has been made in previous issues) continues to attract considerable attention from the electric cooking enthusiasts, and from those whose ideas on the subject are less favourable. This attention is provoked by the original letter obviously containing the whole truth, and nothing but the truth, as to the writer's experience. One of the contributors to the discussion is Mr. W. F. T. Pinkney, the Engineer of the Lighting and Heating Department of the Newcastle-upon-Tyne Electric Supply Company, Ltd. Newcastle is constantly being held up as a pattern to electricity suppliers in respect of electric cooking; but we do not regard Mr. Pinkney's letter as being very convincing. One of the statements that strikes us is that "it is the common experience that the cooking consumption comes down very considerably after the first few weeks, particularly if competent instruction in its use be given." There is another reason why the cooking consumption comes down. A competent instructor is experience in such matters as this; and experience shows the users of electric-cookers that, for some of the operations classified as cooking use, the hotplate (on which so much is done in the case of gas-cookers) is a wasteful device, and other means of boiling and so forth are adopted. Very often a gas hotplate or boiling-rings are installed, if the electric-cooker has not a companion in the shape of a gas-cooker in the same kitchen. That is one reason for the cooker consumption coming down "very considerably" after the first few weeks. The letter goes on to say that the cooking load does not touch industrial peaks at all; and in many districts it does not touch the lighting peak. The cooking load has not a universal incidence; and it varies with the character of the population—that is to say, this is the experience with gas cooking, which is the most popular cooking method from one end of the social scale to the other. Supposing electricity was adopted for cooking by the working classes, it would then touch the industrial peak, because dinners would be cooked in the mornings while the workers were occupied in the factory or other industrial establishment. In residential districts—at all events in the suburbs of London—the electric cooking load would also, in a short time now, coincide with the lighting peak. One cannot generalize in this matter. The incidence all depends on the social characteristics, as well as the season of the year. A collective cooking load, it is stated, gives a load factor of about 25 p.ct.; and the maximum demand occurs on a Sunday. Both these statements are also subject to local conditions. The letter further states that, while it is desirable to supply at a low rate, it is not at all necessary to supply at so low a rate even as 1½d. per unit, in order to obtain cooking consumers. That again may be true up to a point, but the limit is a very rigid one. Then a remark is made which shows that the cooking consumption has to rely for part of its share of charges upon the lighting consumers. It is unblushingly admitted that the lighting units "are generally sold at a figure which covers many of the standing charges for supply." Therefore the lighting consumers are paying part of the charges that should in fairness fall upon the heating and cooking consumption. Another very general statement, and therefore an exceedingly unsatisfactory one, is that domestic cookers for five or six persons should not cost supply authorities £20, whatever their selling price may be; and maintenance costs on cookers have fallen considerably in the last year or two, so that rentals also may be kept low. Wear and tear varies very much in different households; and therefore maintenance has no generally applicable factor that can be applied all through, and the rental has to be at a figure that is an average of all charges. It does not do to fix rentals on an exceptionally good piece of isolated experience. In Newcastle—large and densely populated—there are nearly 500 cookers in use which are rented at from 7s. 6d. to 18s. a quarter, according to size and finish. Nearly 500 electric-cookers is not wonderful for such an area. The local shareholders of the Electric Supply Company ought to furnish a connection exceeding that number. What is the number, too, compared with the gas-stoves in use in the area?

Fixed Charges per Lamp.

We have often referred to the fact that fixed charges per lamp are conducive to extravagant use, and therefore to non-paying consumers. Yet this is the remarkable plan that not a few electricity officials have adopted for trying to increase business from the ranks of the working class. The Walsall Town Council were among those who used this method of doing business; and they have dropped it. Their system was to charge their own tenants a flat rate of 2d. per lamp per week; but what we should have expected was found, that these tenants consumed twice as much electricity as did the occupiers of houses who are supplied on the meter rate.

Fuel Returns.

At the meeting of the British Association, the Fuel Economy Committee, in the section of their report treating of "Fuel Economy and Power Production," made a suggestion for the consideration of the Electricity Commissioners. Dealing with the production of power by public utility concerns, the Committee pointed out that the Commissioners could render a national service, if, in their annual returns, they published such financial and detailed technical data as are necessary to show the actual fuel consumptions and total cost of production per unit of output in the various individual power stations throughout the country. The present annual returns, the Committee submit, are not sufficiently detailed for this purpose, and in particular do not show the circumstances (such as load factor) under which the current is produced. It would undoubtedly stimulate healthy competition, promote fuel economy, and reduce costs, if the individual power stations were required to furnish for publication all the necessary technical data to enable fair comparisons to be made.

Producer Gas for Electricity Generation.

The Leek District Council have enlarged their electricity generating capacity, and for the purpose have adopted a gas-producer plant. The contract was placed with the National Gas-Engine Company; and the estimated cost is £15,000. It will be interesting to learn how the manufacturing

costs of the new plant compare with those that formerly obtained. In 1904, the output of units was 14,207; and the cost was 6·9d. per unit sold. In 1921-22, the output was 1,117,301 units; and the generating cost was 1·99d. per unit sold.

End of a Long Feud. There will probably always be trouble between local traders and municipal bodies who indulge in the vending of goods. A feud has been going on for years, between the Sheffield Electricity Supply Department and the local electrical contractors; and then something like a settlement was arrived at in 1918, when the Sheffield Corporation obtained a definition in an Act as to what they might or might not do in this regard. If our memory regarding the matter serves us faithfully, the clause dealing with the question was the result of a compromise. This has become the basis of an agreement, which arranges that the Corporation shall provide, equip, and maintain a showroom for the display and demonstration of electrical apparatus of any description, and shall sell direct to the consumer all such electrical apparatus (other than electrical fittings beyond the ceiling rose or wall or floor outlet for electric lighting installations) as they are empowered to sell by Act of Parliament. The Corporation are not to sell any apparatus or fittings except for use on the Sheffield distributing mains. The Contractors' Association will co-operate with the Corporation in the sale of electric fittings for lighting installations which the Corporation may only sell through a contractor. Members of the Contractors' Association may purchase from the showroom any apparatus, fittings, or lamps which they may require for installations to be connected with the Sheffield supply mains, obtaining them at a discount not exceeding 25 p.ct. of the selling price. The agreement, the "Electrical Times" says, is for ten years, with power of renewal from year to year. So long as it continues in force, the Electrical Contractors' Association will not, either directly or indirectly, take proceedings or assist or support proceedings against the Corporation for or in respect of any alleged breach of the limitations as regards trading imposed on the Corporation by the section of the Act.

GAS UNDERTAKINGS IN NORWAY.

BY A CORRESPONDENT.

The position of the gas industry in Norway is in many respects most remarkable. To begin with, the population is small and widely scattered over an extremely mountainous area. A visitor to any of the small villages that line the fiords will soon satisfy himself that it would not be worth while to instal a local gas-works, whereas electricity is often tapped from the high-tension transmission lines that come striding down the hills even into quite remote spots. It is therefore only in towns of fairly large size—and there are not many—that gas can expect to get a footing.

The most serious drawback, however, is that Norway has no coal supply of its own, but is dependent on importation. Hence electrical supply stations only very rarely rely on steam. Generation by water power is almost universal, and in many respects Norway is an ideal country for hydro-electric developments. Here, therefore, we have a country which offers inherent advantages to electricity, and great obstacles to gas.

During the war the disparity in natural advantages became even more acute. Electrical companies, using water power, were little troubled by the rising price of coal. True, they had higher wages to contend with, but in general only found it necessary to increase their prices by about 10 p.ct. The position of the gas companies was very different. They had priority over factories, many of whom could not obtain coal at any price; but the vast increase in the price of imported coal made their circumstances extraordinarily difficult. Whereas prior to the war the cost of raw material was covered by revenue from the sale of bye-products, so that the price of gas was based mainly on expense of manufacture, during the war this was no longer the case. And though prices were raised three or four times, they were in many instances unable to avoid a working loss.

Since the war, however, there has been a marked improvement in the position. The price of coal has come down from £6 a ton to about 23s., and it has been found possible to diminish the charge for gas once more. The impression that the days of gas are numbered is not borne out by facts. According to a writer in "Gas und Wasserfach," whereas in 1913-14 28,548,208 cubic metres were sold to private consumers, in 1919-20 42,150,788 cubic metres—an increase of 38 8 p.ct.—were disposed of.

The system of charging adopted by electric supply companies is such as to encourage the use of electricity for heating and cooking, as well as for lighting. Companies commonly charge a fixed sum, varying from about £4 to £10 per kilowatt demand per annum, and many hotels supplement the wood-bed heating stove found everywhere in Norway by electric radiators. Nevertheless, it is contended that, where gas is available, consumers can still cook by gas more cheaply.

It appears, therefore, that in Norway, as in other countries, the two industries will continue to exist side by side. In Bergen and Christiania, the two largest cities in Norway, both gas and electric lighting are used in the streets, and one even finds hotels that utilize both illuminants. Though gas supply is naturally undertaken on a small scale, a visit to Norway should prove interesting to British gas engineers. Apart from technical matters, they will also discover that Norway is a delightful place in which to spend a holiday, and that the people have much in common with ourselves.

"LOSLES" GAS ECONOMY VALVES.

As the result of years of work and careful experiment, there have been placed upon the market by Mr. George Wilkinson, of Beech Mount, Harrogate, certain devices to which he has given the name of "Losles" (or lossless) gas economy valves. This name indicates their purpose, which is a reduction in the cost of cooking and heating that would prove welcome alike to the buyers and sellers of gas. Though Mr. Wilkinson is better known in the electrical industry, he has given long and close attention to the important question of economy in all forms of heat production and use; and these gas-valves are offered with the assurance that they will fulfil in a reliable manner all that is claimed for them, while the elimination of perishable materials—such as rubber—renders them robust and durable. What is claimed may really be summed up in this—that the selling prices to the public have been fixed at a low figure, which will quickly be covered by the gas saved.

"Losles" gas economy valves are in two forms, and are a development of a successful kindred device used in connection with electric heating for the automatic regulation of temperature. Both forms are small and simple to fix. The first is for attachment to gas-fires and radiators, and by its means, after the temperature of an apartment has been raised to the desired point, the gas consumption is automatically reduced to the amount necessary to maintain it. The valve is fixed between the gas-tap and the stove or radiator, and in such a position that neither the radiant heat from the apparatus nor the sun's rays can play upon it. The temperature is set by means of a milled-edged nut in the centre of the valve cover; and the setting is indicated by a pointer and scale provided on the valve stem. The temperature is readily fixed at anything desired between (say) 55° and 70° Fahr. The valve also compensates for variations in the pressure and quality of the gas.

In its second form, the valve is for use with domestic and industrial gas-ovens, its purpose being the same as in the previous case. A convenient and suitable position for fixing is on the right-hand side of the oven near the top; a small hole being drilled through the wall of the oven to accommodate the valve stem, which projects inside the oven a distance of about 3 in., but presents no practical obstruction. When it is fitted, the oven cannot attain a temperature beyond that for which the valve is set; and when this point is reached, the temperature is maintained. With the opening of the oven door, producing a sudden cooling effect, the gas is again turned on full by the valve, to be once more reduced as soon as the door has been closed and the normal temperature reached. The setting of the valve is accomplished in precisely the same manner as in the fire type; and thus the cooking temperature can be varied at will from maximum heat to minimum, with a sufficiently wide range between, so that cooking can be carried on under exact conditions. Looking at particulars of an experimental investigation of the working of this type of valve, evidence is found of the usefulness of the device. Tests on an oven, without the valve, at an initial temperature of 350° Fahr. when the gas was turned on to its maximum, and with an oven fitted with a "Losles" valve adjusted to maintain the temperature at 350° with the usual gas-tap full open, showed that with the valve the consumption was only 46 p.ct. of that when the valve was not fitted. The unattended oven without the valve reached the high temperature of 600° Fahr.

These valves, we are informed, have been in use by engineers and managers for over twelve months, and in the electric form for several years, with highly satisfactory results.

North British Association and Gas Efficiencies.—In the course of the discussion at the North British Association meeting on "Gas Efficiencies," as reported on p. 586 of the "JOURNAL" for Sept. 13, Mr. John Wilson, of Motherwell, was reported to have said, after referring to an experience with a station meter, "the trouble appeared to be entirely due to the giving-out of the chains on the manhole doors." "Chains," of course, should have been "joints."

Recovery of Heat in Coke Cooling.—In a paper which he read at last year's meeting of the Société Technique, M. Piaton referred to a plant at Zurich in which the coke is dry quenched in a closed receptacle containing a mixture of inert gases. The heat taken up from the coke by the gas is then transferred to a boiler, and the gas is led back to the receptacle. According to a writer in "The Times" Trade Supplement, during the first year's working it has been found that on the average a ton of coke produces 886 lbs. of steam at 57 lbs. pressure with feed water at 40° Fahr., so that 1 lb. of coke yields 450 B.Th.U. in the form of steam. This result, he says, shows that considerable quantities of heat may be saved, with corresponding saving of fuel, since the steam costs very little. The quality of the coke is also improved; and as the plant works automatically, the cost of labour is less than with the usual method of quenching.

THE CHARGES FOR GAS.

By NORTON H. HUMPHRYS.

IN connection with criticism, one frequently hears of "the play of 'Hamlet' without the leading character;" but the recent newspaper discussions on the charges for gas go much farther ahead than is indicated by this expression, being remarkable for the absence not only of the lead, but of all the items concerned as "the principal characters"—such as the following: (1) The unique methods under which the accounts of gas undertakings are controlled by Government, and also rendered available to any consumer of gas (and incidentally to any trade competitor). (2) The Government regulations relating to the correct registration of meters. (3) The fact that the consumer can at any time estimate the accuracy or otherwise of the indicated consumption, or ascertain if there is any loss due to leakage of unconsumed gas. (4) In comparing the consumption of gas during the quarter ended June 30 last with that for the corresponding quarter in the previous year, an important point is that whereas the use of gas was unrestricted in 1922, both supply and consumption were subject to substantial curtailment in 1921 on account of the national coal strike. (5) The extensive use of unsound and unsuitable appliances supplied and fixed by tradesmen or artizans who know little or nothing about the properties of gas, the chemistry of combustion, or the degree of care and accuracy of workmanship that is indispensable to the attainment of a sound gas-tight job. (6) The fact that the Gas Regulation Act is a financial relief measure, necessary to redeem the gas industry from absolute ruin. (7) The effect of war conditions on the facilities for raising capital.

So much for the *suppressio veri;* but the *suggestio falsi* must also be reckoned with. Much of this is due to sheer ignorance rather than deliberate misrepresentation, though the disposition to accept without inquiry any assumption that tells against gas is constantly in evidence. Of these, the idea (as widespread as it is erroneous) that a customer buying gas by the therm will pay more for it than he would if supplied with a similar quantity and quality at per cubic foot, and that the new unit was devised by the gas interests with this end in view, may be instanced. Then there is the prevalent notion that variations in the calorific value of gas (shown by published official tests to be a difference of less than 5 p.ct.) will account for an increase of 100 p.ct. or more in the gas bill, and that in the matter of extortion and profiteering gas undertakings stand in line with Government Control, Assessment Committees, or other absolute and unregulated monopolies.

PUBLIC CONTROL OVER THE ACCOUNTS.

A full and complete statement of accounts must be prepared annually, in compliance with forms included in the Gas-Works Clauses Act, 1871, audited by an independent chartered accountant, and copies sent to every shareholder, the Joint Stock Registrar, the Board of Trade, local authorities, and kept on sale to any applicant at the registered offices, at a nominal price. Parliamentary returns are issued, which are also available to the public; and a large quantity of information is published in the Technical Press. I can only explain the fact that 99 p.ct. or more of the figures thus made public are practically thrown into the waste paper basket, and that none of the writers to the papers appear to be aware of their existence, by the fact that they are not understandable by the man in the street. Gas interests are popularly supposed to have wangled the therm, and similarly some have assumed that they have, in like discreditable manner, purposely encouraged complexity in the form of account, with a view to limiting inquiry; whereas the truth is that both therm and account were designed by Government, not for the benefit of gas interests, but for the protection of consumers. Many secretaries will agree that the knowledge of accounts possessed by the average shareholder does not go far beyond the balance available for dividend. But inability to take advantage of these facilities is no excuse for an assumption that they do not exist.

A strictly regulated monopoly, preventing waste of money by competition or in any other direction, and limiting the quality, prices, and profits, is not peculiar to the gas industry or in any sense a novelty. Research into ancient municipal charters will show that regulated monopolies relating to bread, beer, and other necessaries have been in use from the earliest times, as a means of protecting the consumer from profiteering on the part of trade combines, corners, and uncontrolled monopoly. In view of extensive development in this direction, the regulated monopoly is likely to be more in evidence in the immediate future than it has been in the immediate past. One may speculate on the probable effect as regards the interests of the consumer, if similar regulations to those controlling the quality and price of gas were applied to other necessaries of civilized life. Strange to say, all sorts of absolute monopoly pass without notice; while incompetent criticism is directed against one of the most beneficial systems for protecting the rights and interests of consumers ever known to man. It occupies a similar position in regard to producer and consumer to that which co-partnership holds between capital and labour. But to the public a monopoly is a monopoly, whether absolute or regulated. There is no recognition of the fact that the one may ignore while the other protects the consumer.

THE GAS CONSUMER AND HIS METER.

An accurate registration of the quantity of gas consumed (or wasted by leakage) is controlled by Government regulations, which, unlike the foregoing, are applied in similar form to all weights and measures used in trade. Necessarily, a small margin must be allowed for error, and, as applied to the gas-meter, this practically acts as a tip of the scale against the seller. Certainly the provisions for dealing with inaccurate registrations are not adequate, and gas companies require more protection in respect to meters which are the property of the user or the landlord. It might be an advantage if meters were not allowed to run in use for a period exceeding (say) twelve years without being tested; and gas undertakings might with advantage give serious attention to the capabilities of the meter test dial in connection with the user's distribution system, which may be, and frequently is, responsible for a loss of gas that is credited (or discredited) against the general gas consumption. The fact that the consumption of gas can be checked, without special technical knowledge, at any convenient period, and that the test dial is always available, are not appreciated or utilized to an extent commensurate with their importance.

A common defect, and a most undesirable one, is the liability of the meter to slow-down, perhaps over two years or so—so gradually that detection is not possible until an acute stage has been attained. If the meter belongs to the seller, it can be changed and tested; but if not, there is a desperate fight for its retention. One plausible excuse or another is put forward by the user, to account for a smaller consumption. Not until absolute stoppage is evident will he accept defeat, and then does so with bad grace, and claims that the meter is for the use of the company only, and that it ought to be renewed free of cost. He does not, or will not, recognize the fact that one of the conditions under which gas is supplied is that the user accepts the responsibility of maintaining not only his house fittings, but also the meter in proper order and repair. Sometimes the process is accompanied by increased working pressure, and complaints of bad supply that cannot otherwise be explained may well be scrutinized by the meter inspector. Owing to fluctuations in the quantity of gas consumed, climatrical changes, strikes, &c., the defect may not be ascertained until the seller has sustained a serious loss.

The Government have afforded numerous examples of the demoralizing effects of giving something for nothing. The free gift soon comes to be regarded as a right. There was never more pauperizing in one form or another than at the present time, and never less gratitude. So there is no occasion for surprise if the effect of receiving substantial quantities of gas without payment is to convert a friendly fair-dealing consumer into an implacable enemy. The stopped meter is replaced by a new one, which perhaps works freer and affords a more liberal supply, with the result that more gas is used, without apparent increase of service. The next quarterly bill is received with howls of indignation; and it is possible that some of the complaints of a threefold increase (so dear to the editor of the daily paper) may thus be explained.

Another explanation is that the meter readings are occasionally not up to time. Public holidays, stress of weather, employment disputes, and other causes may hinder the progress of the quarterly round for a week or ten days, with the result that the bill represents 100 days' consumption, but is compared on all fours with the usual 90. The proportionate reduction in the following period passes without notice. There is a tendency to regard the consumption one quarter with another as following an even course from year to year; but, in fact, it is subject to continual variation. In any case, the minimum charge is taken as the one and only fair basis, and anything in excess of this figure is apt to be regarded as extortion.

WASTE OF GAS.

The difficulty of rousing interest in the subject of "waste," either by the escape of unconsumed gas or by the use of appliances falling far short of realizing a respectable "duty" from the gas consumed, is remarkable, especially when compared with the care exercised in respect to waste of other commodities. The householder who would quickly resent the loss of a penny, or the housewife who would not tolerate "perquisites" in the kitchen, contemplate with indifference, or rather will not recognize, the no less tangible loss in the form of cubic feet or therms. The more valuable the gas, the greater the loss, which is entirely independent of the price; and therefore the value wasted during the last seven years, and now being wasted, is greater than in previous periods.

The time when leakage was so common that the practice of turning off the main tap before retiring for the night was with many a religious observance, and was recommended even by those who might be expected to know that prevention of leakage during hours of non-consumption was at best a partial remedy, and that any saving thus obtained was direct evidence of corresponding loss during the hours of usage. Apart from this, the prestige of gas suffered by the suggestions that leakage and disagreeable, if not poisonous, odour were an unavoidable accompaniment to the use of gas. If evidence of the extent of loss by the use of unsound fittings was needed, it is furnished by Dr. Carpenter in a paper submitted to the recent meeting of the Institution of Gas Engineers. One two-light pendant (cost 13s. 6d.) was found to lose 0·48 therm per 100 hours under 30-10ths pressure; and a second (price 15s. 6d.), 0·55 therm. Roughly, this is equivalent to 1 c.ft. per hour, or nearly 9000 c.ft. (say, 45 therms) in the course of twelve months. Some other fittings showed about one-tenth of this figure, and even at this rate the waste in a year would more than cover the extra cost of a first-class article. These investigations might with advantage be extended to testing the soundness of whole systems comprising

"cheap material and inefficient labour." And the defects are of a kind that might be expected to increase with usage. No less impressive are Dr. Carpenter's tests of the "duty" afforded by cheap incandescent burners; and such investigations might well be extended to cover also the "duty" furnished by variously largely used forms of atmospheric heating burners. But quite enough has been proved to warrant the assumption that waste of gas is a matter calling for serious attention on the part of gas undertakings. It is a handicap in competition.

Suggestion of loss by leakage usually receives the impatient reply of "Nonsense! If there was any escape we should smell it." But, as a matter of fact, gas can and does escape in quantity, and the loss goes undetected for years, as all who have had extended experience with distribution will agree. Gas-pipes are carried in all sorts of remarkable places, from the cellar to the roof, preference being given to secluded and unget-at-able localities. Among many personal experiences the following may be instanced: (1) A notch scraped in compo. pipe by the working of an adjacent skylight; (2) compo. pipe gnawed by rats, in a corn store; (3) fracture of an outside pipe extended along a wall to supply a stable yard lamp; (4) leaks in underground pipe carried to outbuildings, due to corrosion by drainings from stable manure heap (the gas was deodorized by passing through soil); (5) pipe crossing chimney breast perforated by a picture nail, the escaping gas passing into the chimney.

The Financial Position.

There is a general disposition to rush into hasty and incomplete assumption as to costs and profit, especially in regard to current costs of coal. Much of the present dissatisfaction is grounded on the basis, already instanced, that the minimum charge is the only just one, and that gas "ought" to be sold at something like pre-war rates, combined with ignorance that this is quite impracticable for many reasons. Taking the net cost of coal, which is the leading, but by no means the only, item on the expenditure side, the 1922 rate is nearly double that of 1912. Many other items, such as railway carriage, wages, and rates and taxes, are permanently increased, as also is the cost of capital. Consumers are to-day, and will be for some time to come, paying for the numerous restrictions placed upon the industry by Government during the war, and for the long delay in respect to the Gas Regulation Act. No undertaking can remain in healthy condition without paying dividends that will maintain the value of the existing capital and assure the obtaining of new, when required, on terms that are equitable to the present holders. Capital could be raised in 1912 at 4 p.ct.; now it cannot be obtained for less than 7 p.ct.; and, further, £100 in 1912 was as good as £200 in 1922. Local rates have increased enormously. I know one company who are paying 1s. per 1000 c.ft. of gas sold, and in numerous instances the local authority are getting more out of the profits than the shareholders. The local rates and the cost of capital, taken alone, increase the expenditure to the extent of anything up to 2s. per 1000 c.ft. of gas sold. Newspaper editors and correspondents know nothing about this, and care less.

Gas interests cannot allow to pass unheeded the enormous extent of ignorance and misunderstanding that has recently been evidenced in the columns of the Daily Press. Great is the influence exercised by the "paper." It is up to the managers of gas undertakings to see that their customers are correctly informed on all matters bearing upon cost of gas, as represented directly by the price per 1000 c.ft., or indirectly by waste due to leakage or low duty. The following extract from the "Gas Age Record," New York, appropriately describes the attitude of the "Daily Mail": "Unless a utility is in the position comparable to the man who is about to go down for the last time, some newspapers are not happy. It is a cause for deep gloom when a gas company is in a position to pay its obligations to those who have invested their money in the instituiton. It occasions more or less grief if a company is able to make a financial showing that will enable it to borrow money at reasonable rates. If by reason of straitened circumstances a gas company is not in a position to make extensions of its distribution system and betterments to its manufacturing plant, such newspapers are the first to complain, yet the moment a company gets a grasp on the life preserver thrown out by the public service commission to save it, the disposition is to bang it on the head with an oar and thus put it in its former precarious position."

Manchester and District Junior Gas Association.—Members have been invited by the President, Mr. George Dixon, B.Eng., to visit the Lancaster Gas-Works, of which he is Engineer and Manager, on Saturday, Oct. 7; and an attractive programme has been arranged. An inspection during the afternoon of the gas-works, showrooms, and castle, will be followed by tea provided by the Gas Committee; and then the President will deliver his Inaugural Address. Ladies are invited to take part in the visit.

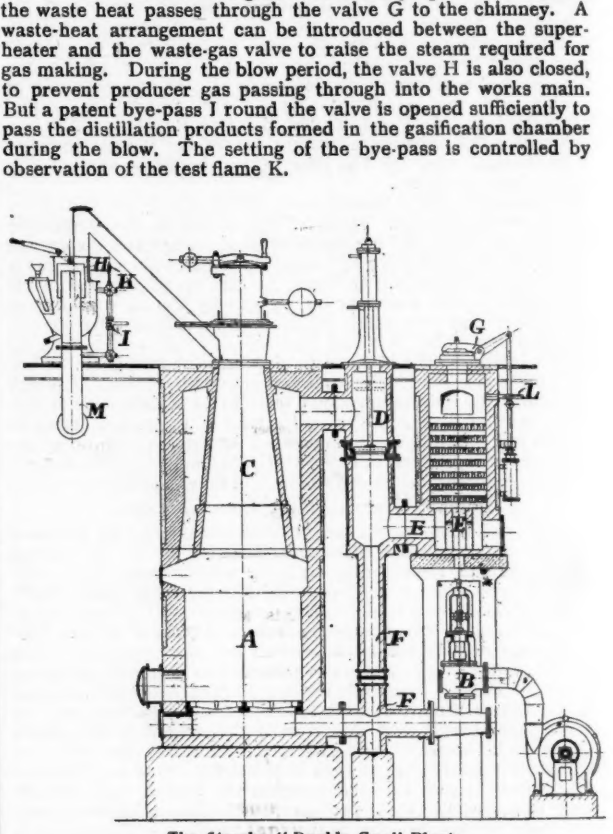
The Ceramic Society.—Lieut.-Col. C. W. Thomas will preside at the eleventh meeting of the Refractory Materials Section of the Ceramic Society, which is to be held at the Chamber of Commerce, New Street, Birmingham, on Tuesday and Wednesday, Oct. 3 and 4. Prof. J. W. Cobb will take part in a discussion on "Bricks for Coke-Ovens;" and he will also be joint author with Mr. H. S. Houldsworth, B.Sc., of a paper entitled "The Behaviour of Clays on Heating." Another contribution is to be by Sir A. Duckham, on "Some New Forms of Kilns." Members will dine together on the Tuesday evening at the Grand Hotel.

THE STRACHE PROCESS OF COMPLETE GASIFICATION.

[A. Breisig, of Vienna, in "Das Gas- und Wasserfach," Aug. 12, 1922.]

As recently as Aug. 30, a description of a complete gasification process invented by a Dutch engineer, Rincker, appeared in our columns. For comparison, it is interesting to examine the method by which Prof. Strache, of Vienna, produces what he, for obvious reasons, calls "double" gas.

The plant is best described by reference to the plan given. The water-gas process takes place in the lower part A of the producer proper. At the beginning of the process, this space is filled with coke, which is blown hot by means of air entering by the valve B. The resulting producer gas is drawn off at the separation zone between the lower part A and the carbonization chamber C, and passes through the valve D into the superheater E. Here it is burned with secondary air, which is drawn from the main air current through F without any special valve; and the waste heat passes through the valve G to the chimney. A waste-heat arrangement can be introduced between the superheater and the waste-gas valve to raise the steam required for gas making. During the blow period, the valve H is also closed, to prevent producer gas passing through into the works main. But a patent bye-pass I round the valve is opened sufficiently to pass the distillation products formed in the gasification chamber during the blow. The setting of the bye-pass is controlled by observation of the test flame K.



The Strache "Double-Gas" Plant.

For gas making, all the valves are reversed, and steam enters the superheater at L, and passes through the pipe F into the lower portion A of the generator. Here water gas is produced, which passes hot into the distillation chamber C, where it distils the bituminous material. The resultant coke descends as required into A, and the mixture of water gas and gas distilled in C, which the inventor calls "double" gas, passes through a hydraulic main into the production pipe M. The reversing of the valves is actuated hydraulically with one movement of the control.

The aim of the inventor of the process was, it is explained, to effect economy by combining the carbonization and gasification processes. In this way, it is claimed, there is saving of the producer fuel generally required for carbonization, the heat lost in quenching the hot coke and in the repeated blowing of the water-gas producer, and in the quality of coke, which deteriorates to such an extent in quenching and transport. At the same time a considerable quantity of heat is recovered by the superheating of the steam to high temperatures. Since the coke has merely to slide down from the carbonization chamber to the water-gas producer, its quality, as far as firmness is concerned, is not of much moment. Consequently, high-priced coke is not necessary, and the utility of the apparatus is therefore not confined to the carbonization of good gas coal. Brown coal, lignite, or, in fact, any fuel usually considered suitable for producer-gas making can well be used. The calorific value of the double gas is considerably higher than that of water gas, so that about twice as much can be added to coal gas to give a mixture of 4000 cal. [450 B.Th.U. per c.ft.]. But the main advantage of the process is that, with fuels of the most varying kinds, a gas, practically free from inerts, of almost constant calorific value—3200 to 3500 cal. [360 to 370 B.Th.U. per c.ft.]—is obtained. The explanation of this rather

surprising statement is that the main constituent of the gas is the water gas resulting from the fixed carbon. For example, compare a coal with 55 p.ct. of fixed carbon, which gives 30 cub.m. of 5000 cal. illuminating gas per 100 kg. [10,760 c.ft. of 560 B.Th.U. per ton], with a brown coal having 35 p.ct. of fixed carbon, and giving 25 cub.m. of 4500 cal. illuminating gas per 100 kg. [8970 c.ft. of 500 B.Th.U. per ton].

The gas coal gives

55 × 2 = 110 cub. m. water gas at 2700 cal. = 297,000 cal.
30 ,, ,, illum. ,, ,, 5000 ,, = 150,000 ,,
140 ,, ,, double gas of 447,000 ,,
i.e., 3193 cal. per cub. m. [359 B.Th.U. per c.ft.].

The brown coal gives

35 × 2 = 70 cub. m. water gas at 2700 cal. = 189,000 cal.
25 ,, ,, illum. ,, ,, 4500 ,, = 112,500 ,,
95 ,, ,, double gas of 301,500 ,,
i.e., 3173 cal. per cub. m. [357 B.Th.U. per c.ft.].

Experience has proved that the calorific value of the double gas is some 100 calories higher than is given by this method of calculation, since the large volume of water gas carries part of the easily volatile tar constituents in gas form. Such constituents are also found in the tar from the process in greater quantity than in ordinary gas-coal tar. This is due to the fact that the products of distillation immediately after formation pass into zones of cooler matter, and thence quickly leave the plant, so that they rather resemble the products of low-temperature carbonization. In ordinary gas-works practice, the reverse happens; the products going from cooler to hotter zones, and generally along hot retort walls. The Strache process accordingly gives a very much higher yield of tar—many times as great with some fuels—and also some two-and-a-half times the quantity of ammonia.

The first Strache "double-gas" plant, it is related, was operated at the Esseg works of the Budapest Gas and Electric Company in 1908, but had to be dropped after a very short life, owing to the municipality's demanding, under its contract, pure coal gas. Its progress for some years was mainly confined to the installation of merely experimental plants at various places, including Hamburg and Vienna. Improved from time to time in detail, its opportunity came under war conditions, when several plants were adopted by various gas-works on a commercial scale. Among these is the Bologna works, said to be one of the most up to date in the world. Here other water-gas plant has been dropped in favour of the Strache process, and double gas is delivered mixed with equal quantities of coal gas, produced from English and American coal in horizontal chamber ovens. The works supervision is stated to be very careful, so that the results achieved with the Strache plant may be taken as showing its capabilities. A guarantee test was made on May 2, 3, and 4 of this year, and the analyses of average coal samples used were:

	P.Ct.		P.Ct.
Moisture	2·25	..	1·65
Ash	6·70	..	5·80
Volatile	33·75	..	34·85
Fixed carbon	57·30	..	57·70

or an average of 91·8 after deducting ash and water. The gross calorific value was 7866 cal. [14,155 B.Th.U. per lb.]. Exactly 34 tonnes of coal were used for the tests, and 50,062 cub.m. [1,767,930 c.ft.] at N.T.P. [0° C. and 760 mm.] were produced. This works out at

59,886 c.ft. (unreduced) per ton original coal.
52,818 ,, (at N.T.P.) ,, ,,
57,554 ,, (,,) ,, pure coal.

The mean of 60 tests gave a gross calorific value of 3399 cal. per cub.m. [382 B.Th.U. per c.ft.] at N.T.P. About 2 tons of clinker were produced.

The mean of five gas analyses was:

CO_2	7·042	H_2	47·992
O_2	0·000	CH_4	6·390
C_nH_m	2·812	N_2, &c.	8·514
CO	27·250		

The hourly make was between 1000 and 1100 cub.m. [31,315 and 38,846 c.ft.]. Tar and ammonia could not be determined, as no special coolers and scrubbers had been installed. These are now being added.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

MEETING AT CHESTERFIELD.

Interesting Visits to the Bryan Donkin Company's Works at Chesterfield, and the Stanton Iron-Works.

THE One Hundred and Ninety-Third Quarterly Meeting of the Manchester District Institution of Gas Engineers, which was held at Chesterfield on Wednesday last, and, by adjournment, on Thursday, at Stanton, near Nottingham, proved one of the most interesting and instructive gatherings in the Institution's long and varied experience. It was a venture to arrange for a two-days' assembly; but the experiment was admitted by all concerned to be a great success. For one thing, the weather, so variable of late, was beautifully fine. Most of the members attended on both days. Some came for the first day's proceedings, and others presented themselves on the second day; but whatever the course taken, the visit will stand out in the recollection of all who attended as a very memorable one.

THE CHESTERFIELD GAS UNDERTAKING.

On arriving at Chesterfield, on Wednesday, members made their way to the Corporation gas-works, which are under the care of Mr. Harold Davies, the President of the Institution. The works bear the impress of their eminent designer, the late Mr. Thomas Hawksley. They are well laid out and up-to-date in every particular. A layman could not help being struck with the cleanliness and orderliness of the concern, and with the presence of trees, shrubs, and flowers on the border-grounds of the works. Mr. Davies guided his visitors round and through the works, and was cordially thanked for his courtesy.

In regard to the Chesterfield gas undertaking, it was interesting to learn what the Gas Committee and their able Manager are doing to uphold the prestige of the gas industry in the town. As in so many other places, the Corporation have been building houses on a fairly large scale; but it was specially pleasing to hear that the Committee have secured the right to supply 583 new houses with gas, and that all these have been fitted throughout by the staff of the Gas Department. The equipment of the houses includes full lighting, with the addition of one gas-heated washing copper and one gas-fire and overmantel complete. A space has been left and pipe run for the fitting of gas-cookers, which are, however, not part of the equipment of the houses, but would be rented at the option of the occupiers. Public utility societies have erected 58 houses upon private housing estates; and subsidy houses, &c., to the number of 83 have also been completed. A large number of these have been piped and fitted by the Corporation Gas Department. The mains necessary for supplying gas to all this property were laid upon a guarantee from the Ministry of Health that the gross income from gas used should be at least equal to 20 p.ct. per annum on the cost of the mains for the first two years, otherwise the difference would be made up by the Ministry. The building schemes have been completed with such rapidity that the total gas income for the first twelve months is in excess of the 20 p.ct. so guaranteed. The price of gas in Chesterfield is: For lighting, 4s. per 1000 c.ft.; for heating and cooking, 3s. 6d.; and for gas-engines and industrial purposes, 3s. The gas is being supplied of a quality of 480 B.Th.U. per c.ft. With the plant and equipment at the gas-works there is no fear that regularity in the heating value of the gas will not be maintained.

LUNCHEON.

Leaving the gas-works the party passed to the Station Hotel for luncheon, which was given by Alderman GEORGE CLARK, J.P., Chairman of the Gas Committee, and head of the Bryan Donkin Company, Ltd., Chesterfield, who himself presided.

The CHAIRMAN, in the course of a speech following the luncheon, gave the visitors a cordial welcome to Chesterfield, on behalf of the Gas Committee and of the great engineering works owned by the Bryan Donkin Company. He was pleased that the members of the Institution had come to Chesterfield during the year of office of their President—Mr. Harold Davies. They felt that it was an honour to Chesterfield that the members had thought well to honour Mr. Davies by making him their President, and that the Bryan Donkin Company had been given an opportunity of showing them their works—one of the oldest engineering works in the kingdom. In 1803 and following years, the works (then in Bermondsey) were associated with such names as Watt, Murdoch, Telford, Brunel, Nasmyth, and others. In submitting the toast of "The Manchester District Institution of Gas Engineers," he pointed to the widespread ramifications of the gas industry. In the United Kingdom alone there were 1630 gas undertakings, the capital employed amounting to £140,000,000; the annual wages bill was over £8,000,000; and the number of gas consumers was 12½ millions. The Bryan Donkin engineering works had been intimately associated with the gas industry since 1847; so that it was quite fitting that the Manchester District Institution of Gas Engineers should come and see them.

Mr. HAROLD DAVIES, replying to the toast, said that, in the works referred to by the Chairman, they would see something which would not only interest but instruct them. The works were of long-standing; but they were up-to-date in all ways. On the

occasion of the last meeting, the members saw what they were up-against in the matter of smokeless fuel. This time they saw another kind of works—works, he fancied, which would be something of a revelation to many of them from an engineering point of view.

The PRESIDENT then proposed the health of the Bryan Donkin Company, Ltd.

Alderman EASTWOOD, one of the Directors of the Company, and Sir ERNEST SHENTALL, one of the shareholders, acknowledged the toast.

THE BUSINESS MEETING.

Shortly afterwards the members assembled in the Council Chamber of the Corporation of Chesterfield for a business meeting. The DEPUTY MAYOR (Alderman Edmunds) gave the visitors a hearty welcome to the town, and to the use of the Council Chamber. Before the Corporation representatives departed,

Mr. W. M. CARR (Ormskirk) proposed a vote of thanks to the Mayor and Corporation for allowing the Institution the use of the Council Chamber. This was seconded by Mr. C. S. SHAPLEY (Leeds), and passed with acclamation.

Mr. HAROLD DAVIES then took the chair; and the business, unusually brief, was speedily transacted.

The minutes of the last meeting were "taken as read." The following new members were formally inducted: Mr. Thomas W. Barrett, Morecambe; Mr. John E. Buckley, Marsden; and Mr. George Lindley, Dukinfield.

ELECTION OF OFFICE BEARERS.

Mr. J. E. Lister Cooper, of Yeadon, and Mr. Fred Peel, of Tyldesley, were appointed Scrutineers of the ballot papers for the election of officers. Eventually the President announced the appointments for next year as follows:

President: Mr. R. E. Gibson, Liverpool.
Vice-Presidents: Mr. G. S. Frith, Runcorn; and Mr. F. Robinson, Harrogate.
Hon. Treasurer: Mr. T. Banbury Ball, Rochdale.
Hon. Secretary: Mr. W. Rogerson, Middleton.
Members of Committee: For three vacancies on the Committee the following were chosen: Mr. D. Dixon, Lancaster; Mr. G. P. Mitchell, Blackburn; and Mr. F. G. Shaw, Buxton.
Auditors: Mr. Wm. Hill, Stalybridge; and Mr. Francis Elliott, Leyland.

On the motion of Mr. SHAPLEY, seconded by Mr. G. S. FRITH and supported by Mr. JOHN WILKINSON (Nottingham), appropriate recognition was made of the hospitality of the Bryan Donkin Company, Ltd., and their kindness in allowing the visitors to see their famous works.

Visit to the Bryan Donkin Company's Works.

A visit of inspection to the engineering works of the Bryan Donkin Company, Ltd., occupied the afternoon following the business meeting. Alderman Clark took the lead in showing the party some of the things that are made at these works, and the processes employed in their manufacture. The visit altogether was one of great interest.

At the close of the tour tea was served, and the visitors were photographed.

Reference has already been made to the age and fame of the Bryan Donkin Company; but a few other particulars will not be out of place. The business was founded in 1803 at Bermondsey, London, by Mr. Bryan Donkin, F.R.S. At the beginning, particular attention was given by the firm to the manufacture of paper-making machines. In the course of years other enterprises were undertaken; and in the decade between 1840 and 1850, the Company began to devote attention to the gas industry. In 1847 a special type of valve, known as the rack and pinion valve, was designed, at the suggestion of the Chartered Gas Company, of London. Although this has had many imitators, it is still one of the chief products at the Chesterfield works, where about 900 tons are turned out yearly. Other designs of valves followed for use in different parts of gas-works.

The firm also took up the manufacture of gas-exhausters, which has since become such an important section of their business; making what was known as the 1847 patent. This was afterwards superseded by the manufacture of John Beale's design, patented in 1866. A number of these were made, chiefly in large sizes, and many are running well to this day. They were, however, gradually superseded by a later patent of Beale's, dated 1877, which has many advantages over his earlier efforts, and has come into use more than any other type in Great Britain. A further patent on this design was taken out by Mr. Thomas Donkin's eldest son, Mr. E. Bryan Donkin, who took a special interest in this class of machine, and read an excellent paper on the subject at the Belfast meeting of the Incorporated Gas Institute, in 1893. He also invented and patented several other improvements in the gas-works apparatus that the firm manufactured, and turned his attention chiefly to developing the business in that direction. He became a partner on the retirement of his father from the business, and was in active control of it for over 20 years, becoming the Managing-Director and afterwards the Chairman of the Company.

After a century of eventful history in Bermondsey, the growing interests of the concern and the difficulties of transit and expansion on an adequate scale in that district, caused the firm to seek greater conveniences; and the whole concern was removed to Chesterfield. An amalgamation was effected with the firm of Clench and Co., and their well-equipped and modern works taken over and adapted to the combined requirements. The site comprised 14 acres, and was connected by sidings with the Midland and Great Central Railway Companies, and was in the centre of the great coal and iron district of Derbyshire. The present Managing-Director, Alderman George Clark, J.P., M.I.Mech.E., came from the London works of the Company at Bermondsey in 1900 as Works Manager, and under his control as Managing-Director during the past 16 years the concern has developed steadily, until at the present time the employees number about 700. Mr. Clark is Chairman of the Gas Committee of the Chesterfield Corporation, and last year was Chairman of the Society of British Gas Industries. He is also a member of the National Gas Council and of the British Commercial Gas Association.

Extensions have been continuous, and during the period 1902-1922 almost all the departments have been considerably enlarged, until at present the area occupied by the buildings alone is nearly 4 acres. In 1912 the present fine offices were built; the old offices being converted into the general stores. In 1917, a new erecting and testing shop of 7900 sq. ft. area was built, and later a women's canteen of 1440 sq. ft. area. A new fettling shop and sand-blast house, a core shop, and works repair shop, have recently been built, and further extensions are in contemplation to meet the increasing demand for the firm's specialties.

In 1902, the works were driven partly by steam-engines direct and partly by steam-driven electric generators. The overhead cranes were operated by means of ropes running the full length of the shops. This has been gradually altered, until at the present day the works are driven entirely by electricity. Early in 1911 the works were connected by overhead cables to the Corporation power station; part of the current used in the shops being generated by steam-driven generators and part by a motor generator from the Corporation mains. At the present time the whole of the current is obtained from the Corporation, who supply it at 6000 volts three-phase; this being transformed to 400 volts for use in the shops. The motors at present total over 1155 B.H.P. A new sub-station was erected in 1921. The shops are lighted partly by electricity, partly by high-pressure gas (10 in.), and partly by low-pressure gas.

The firm have continued at Chesterfield to manufacture their well-known specialties—the positive gas-exhauster, which is now made with two, three, or four blades, according to the preference of the gas engineer; gas-valves; motor parts; tar and liquor pumps, &c. During this period the usual initiative of the firm in adapting itself to the changing times has been shown in many ways, notably in the acquirement, from Prof. Rateau, of Paris, of rights in the turbo-exhauster. One hundred and thirty-four of these machines are already at work or on order in gas-works and collieries, for coke-oven installations, doing duty as exhausters, boosters, blowers, &c., representing a capacity of 58,898,000 c.ft. per hour. They can be driven by steam turbine, electric motor, or belt.

In 1905, one of the representatives of the firm was sent specially to the United States to study the question of high-pressure gas transmission; and since that date the Company have become the acknowledged experts in high-pressure gas in this country and abroad. In addition to the transmission plant, they also make, under licence from the Reynolds Company and the Mueller Company, reducing governors and fittings for district and service purposes.

To take the place of the German coke-oven valve, the Company are manufacturing a light pattern valve with internal or external screw, many thousands of which have been sold. A gland plug cock also has been designed, and has met with a large and increasing demand; and the Company are now making a special tar cock for use on tar towers and tanks.

During the war there was a great demand for the firm's specialties for war purposes. Notably was this the case with regard to positive blowers for use in connection with melting and heating furnaces, the inflation of airships, and for other purposes in the various factories of the Ministry of Munitions.

Recently the firm became interested in British Furnaces, Ltd., who handle every type of heating or fuel treatment equipment.

The total area of the works is 14 acres; the area occupied by buildings being $3\frac{3}{4}$ acres, and by railways, roadways, &c., 5 acres. The general direction of the buildings is east to west. They are mostly of saw-tooth type, with north lights. The majority of the buildings are constructed of cast-iron columns carrying steel roof trusses with patent glazing on one side and slates on boarding on the other side. The latest buildings are constructed of brick. The erecting shop has brick walls with iron trusses, and the core shop, repair shop, &c., have steel columns with brick filling and Belfast type roofs. The general offices are a separate building at the front of the works, and are built of brick and stone. The floors, wherever possible, are of wood. (This refers to the works generally.)

The works are driven entirely by electricity, 1155 H.P. of motors being installed. The current is taken from the Corporation at 6000 volts A.C. and transformed to 400 volts A.C. and 220 volts D.C. for use in the works. The erecting shop has one 15-ton electric crane; in the machine shop, there is one 15-ton and one 5-ton; and in the valve shop, one 2-ton electric crane, besides numerous hand cranes. The old foundry has two 10-ton and two 2-ton electric cranes and numerous hand cranes; and the new foundry has

two 10-ton, one 5-ton, and one 3-ton electric cranes. In the yard are one 2-ton and one 4-ton steam loco. cranes.

Visit to the Stanton Iron-Works.

A few hours of Thursday were spent in a visit to the world-famed home of the Stanton Iron-Works Company, Ltd., at Stanton, near Nottingham. The primary object of the visit, of course, was to see in operation the manufacture of the new "spun" iron pipe which the Company are commencing to make; but the party saw many other things of special interest to gas engineers. The visitors had an opportunity of seeing one machine out of the twelve installed in operation; and they saw pipes being turned out at the rate of some 250 per day of twenty-four hours. It is anticipated that by the end of October four machines will be in continuous operation; and the pipe will then be put on the market on an extensive scale. The Managing-Director of the Company (Mr. E. J. Fox) mentioned, during his address of welcome after luncheon, that in developing this new method of making iron pipes, apart from the ordinary engineering details, the Company had been faced with two big difficulties, both of which had, however, now been overcome. The first difficulty related to the adequate annealing of the pipes after being made on an extensive scale. In other words, while no difficulties had been found in thoroughly annealing the pipes on a small scale, the problem of annealing on mass production lines had not been so simple. These pipes are made in a rotating water-cooled mould, and consequently the metal becomes chilled on the surface, which chill requires to be removed in order to overcome the brittleness from the chilled metal. The resulting pipe, when annealed, gives a tensile strength of anything from 16 to 22 tons per sq. in., as against a tensile strength of 9½ tons per sq. in., which is the British standard specification for ordinary vertically cast pipes made from the same pig iron. In short, the "spun" pipe approaches the strength of steel to a greater extent than it does that of cast iron. The pipes could be made as thick or as thin as might be necessary for meeting working conditions; but in view of the strength of the material, it would obviously be a waste of money to make them of the same thickness as cast-iron pipes, where a margin of safety is required in consequence of possible irregularities in the metal.

The second difficulty which the Company have had to surmount has been the cost of the steel moulds in which the pipes are made. Until recently these have proved abnormally expensive in consequence of the comparatively small number of pipes which could be made before destruction of the mould. This difficulty has now been surmounted; and it is expected the pipes will be placed on the market on an extensive scale in the course of the next month or two. Another point to which further reference might be made is the ease with which the "spun" pipes can be screwed and tapped; the density of the material making possible a thread as fine and as clean as the thread on a forging.

Luncheon.

At one o'clock the party assembled at luncheon in the Company's club-house. In reply to Mr. Fox's address of welcome to the Association, Mr. DAVIES, of Chesterfield, made appropriate acknowledgment.

At the termination of these proceedings, Mr. S. TAGG, of Preston, moved a vote of thanks to the Company. This was seconded by Mr. E. H. HUDSON, of Normanton.

The Tour of Inspection Continued.

After luncheon the visitors were conducted over the Company's old-established iron-works and foundries, and were shown the workmen's canteens, ambulance house, and other details in connection with the welfare side of the organization. The canteen in particular attracted considerable attention, not only in view of the healthy food supplied to the workpeople, but also the favourable and cleanly surroundings under which these meals are served. Comment was made on the fact that, although the Company generated their own electricity from waste gas, all the heating and cooking of the canteen and club-house are carried out by means of gas.

The company dispersed about 5 o'clock in the afternoon.

Some of the remarks of Mr. Fox in his speech at the luncheon had a particular bearing on the industrial problems of the moment. Contact between the employers and the working men, he said, was the only solution of the problems with which we are faced to-day. "We are not members of the employers' organization. I hate organizations that dictate to you what you are to do to-day and what you must not do to-morrow. We are free. The Employers' Federation brought about the engineering strike; but months before this happened, on a question of reducing wages 16s. 6d. per week—which we looked upon as completely monstrous and unfair to the working man, bearing in mind the costs that prevailed—we called our men together and told them we could not make our pipes and compete with the foreigners unless the workers allowed us a reduction. The result was an amicable settlement by which they reduced the wages 10s. a week." As to the new "spun" pipes, he held out the prospect of their being materially cheaper than the old cast-iron ones—a prospect which was received with cheers.

It was mentioned, in reply to inquiries, that the Company employ about 14,000 persons in all, counting their collieries, blast-furnaces, and foundries. The little hospital is open night and day, and there, in the course of a month, some 700 cases of sickness or accident are treated. The Company's yearly output of coal exceeds a million tons. Their furnaces yield 300,000 tons in the same period, and the foundries 200,000 tons. To Mr. Fox in particular, the General Managing-Director, the special thanks of the visitors are due.

THE NITROGEN INDUSTRY.

Papers Submitted to the British Association at Hull.

At the Hull meeting of the British Association a discussion took place, on Tuesday, Sept. 12, before Section B (Chemistry) on the nitrogen industry, when a number of papers were submitted.

POST-WAR PROGRESS IN THE FIXATION OF NITROGEN.

Dr. J. A. HARKER, F.R.S., presented the first, which was on "Post War Progress in the Fixation of Nitrogen." He gave a bird's-eye view of the present state of nitrogen fixation, and discussed some of the more important new developments in regard to which he was at liberty to speak. He pointed out, however, that absence of data about any particular process or development should in no way be taken to imply that progress has not been made. The first described was the arc process, the oldest method of obtaining fixed nitrogen from the air, which consists of burning air by passing it quickly through an intensely hot electric flame. The process was put into commercial operation in Norway in 1904. In the hands of the original company it has been uniformly successful, and has now reached an enormous development. It was pointed out in the report of the Nitrogen Products Committee, published some eighteen months ago by the Department of Scientific and Industrial Research, that, though the power requirements of the process are very large, it nevertheless affords the cheapest known method for the manufacture of nitric acid. The author expressed the opinion that it has not been sufficiently recognized that the arc process, in its industrial form, owes its initiation in a very great measure to scientific researches carried out mainly by British investigators. When, during the war, he saw the developments at Notodden, and the much larger and newer plants at Rjukan, officials of the Norok Hydro Company told him that Prof. Birkeland used to recognize frankly that his inspiration to found an industrial process was derived from the famous British Association address of Sir William Crookes, and especially from the quantitative experimental work of the late Lord Rayleigh. Though the arc process has now reached the stage of a magnificent engineering achievement, it is somewhat startling to remember that less than 2 p.ct. of the electrical or heat energy expended in the average arc furnace is absorbed as chemical energy in the initial oxidation of the nitrogen.

The concentration of nitric oxide in the gases leaving the furnace averages about only 1·2 p.ct.; and therefore it is not surprising that many suggestions have been made for the improvement of the efficiency of the process, and all kinds of alternative forms of furnace plant have been proposed. Some of these have been tried during the war; and about fourteen arc plants of various types, mostly of small output, are distributed throughout the world. One of the more important variants of the original process depends on the use of enriched air, instead of common air. This has been used on a considerable scale by a company operating works in Switzerland and in Germany. The oxygen content of the air utilized is increased to 50 p.ct., and to prevent loss of oxygen the whole operation is carried out in a closed circuit. The product, instead of being absorbed in towers, is generally removed by cooling, as liquid nitrogen peroxide. Though under certain conditions the increase in yield of fixed nitrogen obtained from the enriched gas was considerable, and though many tons of liquid NO_2 were made by the process, certain serious difficulties were encountered, and several explosions have recently occurred in these plants.

Dealing next with the synthetic ammonia process, the author said that this was originally worked out by Haber and his colleagues, among whom he specially mentioned Dr. le Rossignol, an Englishman born in Jersey, and the late Dr. H. C. Greenwood. The process was turned into a technical success by the Badische Company, and is now employed on a huge scale at the original works at Oppau, on the Rhine, and at a much larger works recently completed at Merseburg, in Saxony. But to-day this is by no means the only process for the manufacture of ammonia from its elements. There are a number of other synthetic ammonia processes, distributed over the leading countries of the world.

The process invented by M. Claude differs mainly from the old Haber system in that, under the very high working pressure adopted, about 900 atms., the percentage combination attained in the gases after a single passage is about 40 instead of 10 to 11, giving about 25 p.ct. of ammonia in the issuing stream. Multiple-

stage working is adopted, instead of recirculation of the gas; and the dimensions of a full-sized unit plant giving a technical output of 5 tons per day appear almost absurdly small in comparison with the monumental structures employed in the German process. In the Badische process the cost of preparation and purification of the hydrogen used amounts to from 65 to 70 p.ct. of that of the ammonia produced. It is therefore evident that hydrogen production is of paramount importance, and it is to the preparation of cheap hydrogen by a new process from the gases of the coke-ovens at Bethune that Claude is at present devoting his attention. In the Casale process, as now running at Terni, near Rome, the hydrogen is obtained electrolytically from large cells of a new type, operated from hydro-electric current obtained from waterfalls near by. Some of this hydrogen is burnt with air, and thereby the required mixture of hydrogen and nitrogen is produced. Much attention is now being given to the problem of the bulk generation of electrolytic hydrogen, and a number of proposals are on foot for the use in different parts of the world of electrolytic plants on a very large scale for production of hydrogen for the manufacture of synthetic ammonia.

The cyanamide process was then discussed. This, though stated by many authorities to be obsolete, said the author, had at the end of the war an aggregate capacity in tons of nitrogen distinctly greater than that of any other fixation method. Since the armistice, however, many of the works erected or enlarged during the war have been closed. So far as Dr. Harker has gathered, there has been no new development of outstanding importance in the manufacture of cyanamide itself, though detailed improvements have been made; but, nevertheless, even under the present difficult conditions, cyanamide is still almost certainly the cheapest form of combined nitrogen. Commenting on the fact that cyanamide is at best an unsatisfactory fertilizer for many soils, the author said that, on analyzing a sample of cyanamide a few weeks ago—probably a rather old sample—he had found that the nitrogen it contained had practically all changed-over to the form of dicyandiamide. If this transformation often goes on, to the extent he had noticed, it is no wonder that the action of cyanamide in the soil is sometimes found to be injurious rather than beneficial.

Until lately, the researches made in order to find some process by which cyanamide can be transformed cheaply into some other compound have met with small success. To transform it to ammonium sulphate is a relatively expensive process. An American company are now manufacturing from cyanamide a concentrated mixed fertilizer in the form of mono-ammonium phosphate, which appears to be a promising material, but is too costly for many applications. But within the last year independent investigators working along parallel lines in Sweden and Switzerland have succeeded in perfecting processes, whereby, by the action of carbonic acid, free cyanamide is first prepared from a solution of calcium cyanamide, this being subsequently transformed to urea. In the Swiss form of the process, excess of the sulphuric acid employed in the second stage of the transformation is afterwards used to act upon phosphate rock, which is changed to mono-calcium phosphate. The final product is a neutral body known in France and Switzerland as phosphazote, having its nitrogen content as urea and its phosphorous in the water soluble form. The author is informed that the cost of its manufacture is not high, and that, unlike cyanamide, the substance has no deleterious action on the skin or on the bags in which it is packed. These two new processes may prove to be a means of rehabilitating cyanamide as a product of fixation.

The cyanide process, the oldest practical fixation method, was then referred to briefly; and, finally, Dr. Harker uttered a solemn word of warning with regard to Germany. In 1913, Germany consumed about 200,000 tons of nitrogen, of which more than half, or about 110,000 tons, was imported in the form of Chili nitrate. The bulk of this large consumption was used in agriculture. Prof. Matignon, of the College de France, stated that from May 1, 1921, to April 30, 1922, the smaller Germany of to-day consumed 290,000 tons, which is 45 p.ct more than in 1913, without the demands of her agriculturists being entirely met. Furthermore, the whole of this increased total was produced within the country from her fixation and bye-product industries. But this is not the whole story. The limit of capacity of production of the German works was far from being attained in 1921; and though the German Government pleads bankruptcy, the Badische Company appear to have had little difficulty in finding money to repair the enormous damage caused by the great explosion at Oppau last September. The works are now on the point of being ready to produce their full rated output. At the end of this year Germany will have at her disposal an internal capacity for the production of fixed nitrogen of about 500,000 tons annually—a total so colossal that she will be entirely independent of all importation. In the case of another war, she will thus be assured of the basic materials for a gigantic production of munitions, together with enough fertilizer to enable her to grow a very large share of her food.

MANUFACTURE OF HYDROGEN.

Mr. J. H. WEST, the author of the second paper, on "Raw Materials for Synthetic Ammonia," pointed out that the raw materials for making synthetic ammonia are both gases, and hence their storage and handling are a simple matter. The nitrogen is the valuable constituent of the ammonia, yet three volumes of hydrogen are required to one of nitrogen, and the hydrogen is more expensive to make; so that the cost of production of synthetic ammonia is largely dependent upon hydrogen. There are two main sources of hydrogen—coal and water—and one way of getting hydrogen from water is by electrolysis. It is only in exceptional cases, however, where very cheap hydro-electric power is available, that electrolytic hydrogen can be considered. Hydrogen can also be obtained from water by decomposition in contact with red hot iron, as in the Lane process; but this is too expensive a method for use in connection with synthetic ammonia.

Many coals contain about 5 p.ct. by weight of hydrogen, equivalent to about 21,000 c.ft. per ton. On distilling coal in retorts or coke-ovens, about a quarter of the hydrogen is set free, the other three-quarters remaining in the tar, oils, and ammonia. Coke-oven gas, where available, is an excellent source of hydrogen, which can be separated from it by liquefying all the gases present except the hydrogen, after having removed the carbon dioxide by absorption in water under pressure. The last 1 or 2 p.ct. of carbon monoxide which remain after the liquefaction process may be removed by washing with ammoniacal cuprous chloride, or they may be converted with part of the hydrogen into methane in the presence of a catalyst. Complete removal of carbon monoxide is most important, since this gas is a deadly poison to the ammonia catalyst. Another method is the interaction of steam and hot coke, giving water gas, which contains about 50 p.ct. hydrogen and 40 p.ct. carbon monoxide, the yield being about 55,000 c.ft. of gas per ton of coke. The carbon monoxide in water gas may be caused to react with steam in the presence of a catalyst, producing carbon dioxide and hydrogen.

The author then drew attention to a new process worked out by Dr. A. Jacques and himself, which combines the distillation of coal in a retort, the formation of water gas from the resulting coke, and the conversion of carbon monoxide produced in these two operations into carbon dioxide and hydrogen by reaction with steam in the presence of a catalyst, in one apparatus, thus giving the maximum possible yield of hydrogen from a ton of coal, and avoiding the heat and carbon losses incurred in withdrawing hot coke from retorts into the air and quenching it with water. The hydrogen present in the coal is practically all liberated in this process by passing the crude coal gas through a hot zone in the producer, so that all tar, oils, and hydrocarbons, such as methane, are cracked or split-up into hydrogen and carbon, the carbon reacting with steam to form water gas. The process is carried out in a modified form of Tully complete gasification plant, and the only products are gas and ashes.

THE HAUSSER EXPLOSION PROCESS.

Capt. C. J. GOODWIN, who contributed a paper on "Prospective Developments in the Häusser Explosion Process of Nitric Acid Synthesis," said he felt that a general discussion on the subject of nitrogen fixation would not be complete without some reference to the future possibilities of direct fixation of nitrogen as nitric oxides by the explosion process—particularly as during the last eight years practically nothing has been published in the English language. Briefly, the explosion process has been narrowed-down to the use of gases of high calorific value—preferably coke-oven gas or vaporized liquid fuel—which are exploded either in a bomb or special form of gas-engine, the resulting high temperatures and pressures inducing the formation of nitric oxide which, on rapid cooling of the gases, remains unchanged to the extent of between ½ and 1 p.ct. by volume. Attempts to increase the yield by the use of oxygen were successful; but practical difficulties—particularly pre-ignition—have led to this line of development being abandoned for the time being. Häusser has found that every increase in the capacity of the bombs used has led to increase in the yield of nitric acid; and a plant is now to be installed with a bomb of 1200 to 1500 litres capacity.

It should be particularly noted that the Häusser process can be economically worked on quite a small scale, while synthetic ammonia plant and other systems of nitrogen fixation must necessarily be on a very large scale, and in case of a shut-down—such as that occasioned by the explosion at the synthetic ammonia plant at Oppau—the effect on production and markets would be very serious. A well-designed Häusser plant requires no external energy; the motive power for compressors, pumps, &c., being fully covered by suitable methods of heat and energy recovery within the plant. It therefore follows that the Häusser process can be developed in outlying districts where, under normal circumstances, nitrogen fixation would be quite uneconomical.

The yield from the explosion process is negligible at temperatures below 2000° C.; but the temperature obtained by the explosion of coke-oven gas with air is about 2300° C., giving an exit gas containing 0·8 p.ct. NO. The author has recently applied for patent protection for the use of coke-oven or similar gases, the calorific value of which has been increased by the removal of a part or the whole of the hydrogen, or by their enrichment in other ways. With gases of higher calorific value, the nitric oxide is formed at a higher temperature, with a corresponding increase in yield and efficiency. At the same time, the hydrogen abstracted from the gases could be profitably or economically diverted to the manufacture of synthetic ammonia, hydrogenation processes, &c., so that the explosion process could be considered as a possibly useful adjunct to synthetic ammonia and coke-oven plants, while in places where liquid fuel is cheap, and the cost of making nitric acid is relatively high, there may be scope for the installation of Häusser units solely for the latter purpose.

With regard to the possibility of perfecting the explosion pro-

cess in plant or apparatus other than bombs, the most rational solution may ultimately be found in the use of a special gas-engine, or preferably a modified type of Humphrey pump, whereby some of the calorific value of the gases or liquid fuels would be converted into useful energy. The use of a modified type of Humphrey pump would help to overcome several of the difficulties and inconveniences inseparable from the use of bombs worked at high temperatures.

WATER POWER AND NITROGEN FIXATION.

Dr. E. B. MAXTED, who considered some aspects of the relationship between water power and nitrogen fixation, said that the fixation of nitrogen by any of the three principal processes—namely, by the synthesis of nitric oxide in the high-tension arc flame, by the production of calcium cyanamide, or by the synthesis of ammonia—involves in each case two economic factors, which may conveniently be grouped under the headings of power and materials. The predominance of one or other of these factors will determine, not only the most suitable site for the operation of the process within a given country, but also the economic practicability of the method of fixation under given geographical and mineralogical conditions. Under British conditions, it is probable—save, perhaps, for the manufacture of nitric acid as such, contrasted with the broader problem of fixed nitrogen for agricultural purposes—that two only of the above processes (the manufacture of calcium cyanamide and the direct synthesis of ammonia) are economically possible.

On the whole, the author is of opinion that a sufficiently strong case may be established for the generation of hydrogen by electrolysis to warrant a careful examination of the method side by side with hydrogen from fuel. The principal drawback of the electrolytic process, however, consists in the relatively large floor space required, and in the multiplicity of cells necessary. These disadvantages are being met to a certain extent by the introduction of large unit cells, and the degree to which this enlargement is practicable, together with the even more important desirability of a relatively high operating current density, will probably determine to a large extent the industrial future of electrolytic hydrogen—at any rate, in cases in which the oxygen is not utilized.

A short discussion followed, in the course of which Mr. E. KILBURN SCOTT alluded to the economic possibilities of the arc process. He called attention to its advantages, and protested against the pessimistic attitude towards it in this country, which, he said, sickened him.

The Suction Gas Tractor.

In the current number of "The Engineer" is an article in which reference is made to the success attending recent trials of suction gas apparatus in France, and particulars are given of the construction of tractors of this character, based upon a communication received from M. R. E. Mathot, of Brussels, a well-known authority on internal combustion engineering. It is pointed out that among possible fuels charcoal is undoubtedly the most important, both on account of the excellent results given by trials already made and the comparative ease with which it may be prepared from available supplies of forest or plantation wood. The essential parts of the machine are the producer, the vaporizer or steam generator, and the scrubber, along with a purifier or dryer. Having in view the desirability of reducing the weight and the size of the plant to the smallest practical limit, the use of cast iron should be reduced as far as possible, and preference be given to a thin sheet-metal construction in which riveting may be well replaced by welding. The weight of a suction gas producer designed for tractor service should not exceed from 13 to 17 lbs. per horse power. With a view to reducing weight, the zone of refractory lining material should be as small as possible, both as regards thickness and size; and in some cases it may be advantageous to replace the refractory material with an alternative form of construction in which cast-iron water-cooled walls are used. The water-jacket may then serve as a vaporizer for producing the required steam. At the present time most producers work with a closed hearth; but the open-hearth producer possesses the great advantage that attention may be given to the fire and clinker removed from the grate without disturbing the generation of gas. It is, says our contemporary, to be hoped that before long a satisfactory form of small portable producer embodying this feature of design will be introduced. The vaporizer calls for careful consideration. By placing it near the base of the producer, just above the fire-bars, the amount of refractory material necessary is reduced to the lowest amount, and there is less tendency for slag to be formed. Where charcoal is used, the main function of the scrubber is to free the gas from light particles of dust, and also to cool it.

Yorkshire Junior Gas Association.—We learn from the Hon. Secretary (Mr. F. A. C. Pykett, of the Halifax Gas-Works) that Mr. C. S. Shapley, Engineer and General Manager of the Leeds Corporation Gas Department, has consented to give the opening address at the next annual general meeting of the Association.

Recent Wills.—Alderman Charles King, J.P., of Messrs. King Bros. (Stourbridge), Ltd., who died last February, aged 87, left estate of the gross value of £40,961, with net personalty £23,067. Mr. S. J. Crawford, Vice-Chairman of the Tynemouth Gas Company, left £15,995 (net personalty £6268).

REGISTER OF PATENTS.

Distilling Tar.—No. 184,242.

GLOSSOP, W., and BRADLEY, L., both of Hipperholme, near Halifax, and WILLSDON, R. W., of York.

No. 12,524; May 2, 1921.

This invention has particular reference to the distillation of complex liquids containing water, such as tar. As is well known, the distillation of such liquids is liable at stages to become explosive in character in consequence of the contained water being suddenly converted into steam. The present object is to provide improved means whereby distillation may be safely and effectively carried out; the liquid being subjected to heat while in the form of a thin moving film.

A vertical still suitable for carrying out the invention may comprise a container and a series of trays superimposed vertically one above the other, each tray virtually filling the container except at the delivery edge so that vapour cannot pass round its edges, and alternate trays inclining towards opposite sides of the container so that the lower edge of one tray discharges on to the upper edge of the next. The delivery edges are unobstructed and spaced away from the trays beneath them, so that thin curtains of liquid will be formed as the material is discharged from the trays. External heating means are provided for distributing the heat over the bottom and sides of the still in such manner that the highest temperature is at the bottom of the still; and the liquid is fed into the still at such a rate that only thin films will be formed on the trays. Thus only thin curtains will flow from the delivery edges, for the purpose of causing the vapours given off from the liquid to pass repeatedly through all the curtains of material above the point where generation of the vapours occurs, whereby a scrubbing action is produced on the vapours. Preferably the outlet at the bottom of the still is so disposed as to permit only a shallow layer of liquid to collect.

Analysis and Recording of Gases.—No. 184,279.

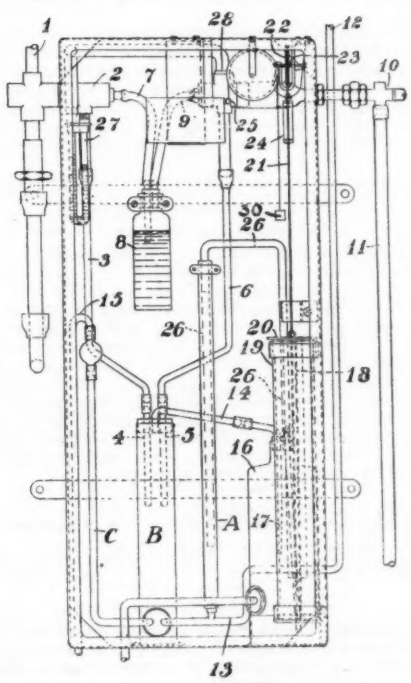
DALE, A. G., of Warrington.

No. 13,447; May 12, 1921.

By this invention, relating to improvements in apparatus for analyzing gases, and more particularly for the volumetric estimation of a gas or gaseous mixture, it is claimed that a great simplification of apparatus is obtained, and the time lag (that is, the interval between the gas leaving the furnace and entering the recording apparatus) is considerably reduced. Also no "bubbling" of the gas through water takes place, thus obviating the necessity of using partially saturated water and a further complication of apparatus.

The invention is more particularly described with reference to the accompanying front elevation of the instrument.

The flue gas enters by the pipe 1 and is drawn through the apparatus by means of a water operated ejector 10, and follows two paths—first, by pipes 2, 3, and 4 into the chamber B, and thence by pipes 5 and 6 to ejector 10 and out through glass tube 11. The second path



Dale's Gas Recorder.

comprises the pipe 7, valve 8, pipe 9 to ejector 10, and then out through tube 11. Owing to the resistance of the valve 8, the bulk of the gas follows the first path. The valve of the ejector 10 is adjusted so as to show bubbles of gas mixed with the water passing down the glass tube 11, which, being fixed on the outside of the recorder case, can easily be seen; and the flow of water through the ejector is regulated to give a steady supply of gas with a minimum consumption of water.

The water, which operates the recorder, is supplied from a ball tank

(not shown) in order to maintain a constant head, which tank also supplies the water for the ejector. The water enters the pipe 12, and then flows through pipe 13 up the three chambers A, B, and C. When the level of the water reaches the bend 15 in the tube C, syphon action takes place and the vessels B and A are emptied. This operation repeats itself periodically at a rate governed by the amount of water admitted to the recorder.

The vessel B acts as an automatic gas trap, since when the level of the water reaches the bottom of the pipes 4 and 5, the flow of gas through the vessel B ceases for a short period and the gas passes through the valve 8. A known volume of gas is therefore contained in the vessel B when the water reaches this level; and on further rising of the water, the gas is forced by the surface of the water through the pipes 14 and 17 into the vessel 16, which contains an absorbing liquid such as a solution of caustic potash which rapidly absorbs the CO_2 in the flue gas. The remainder then passes out of the absorption vessel 16 by a tube 18, which passes up through a float chamber 19 in which hangs an oil-sealed metal float 20 supported by a chain 21 passing over a pulley 22 mounted on point bearing 23, the float 20 being counterbalanced by a weight 24. After the float 20 has risen about four-fifths of its maximum travel, it meets a weight 30 connected by a cord to the recording stylus 25, so as to operate the movement of this over the recording drum.

The gas passing up the tube 18 in the vessel 19 is forced under the float 20, causing the float to rise a distance corresponding to the volume of gas admitted. The float rises to its full height when operating on air when no absorption takes place in the vessel 16; of the full rise of the float, 20 p.ct. only is required for actual recording—this being the maximum percentage of CO_2 under ideal conditions. The pen mechanism 25 is therefore only brought into action when the float has reached 80 p.ct. of its maximum lift. When the level of the water reaches the bend 15 and syphon action takes place, the water falls in the vessels A and B. In consequence, the gas under the float 20 is drawn through pipes 18 and 26 to the atmosphere, and when the bottom of the pipes 4 and 5 are uncovered it continues to pass through the automatic trap vessel B, and the float 20 returns to its original level. This cycle of operation takes place at periodic intervals governed by the amount of water admitted to the recorder. A U-tube water-gauge 27 is connected to the main pipe at 28, and affords a means of indication of the relative state of cleanliness of the pipe-lines and soot filter.

While the above apparatus has been specially described as recording the percentage of CO_2 in flue gas, it is obvious that it is suitable for the analysis and recording of various other gases, such as sulphur dioxide, oxygen, &c., if suitable absorbing liquids are used. If it is desired to use more than one apparatus, then the measuring vessels can be connected in series all recording on the same drum.

Combination Indicating Dials for Gas-Meters. No. 184,818.

GIBSON, R. K., of Edinburgh.

No. 35,651; Nov. 30, 1921.

This invention relates to an indicating mechanism for readily metering in therms according to the quality of the gas at any time, as well as in cubic feet or other convenient volume; also to means for calculating the cash value when the price per therm is given, or the price per 1000 c.ft.

The mechanism is characterized by having two dials in tandem with graduated scales; one graduated in therms with a pointer attached to the periphery capable of revolving, the other graduated in cubic feet, which remains stationary when operatively connected with the volumetric mechanism of the meter. There is in addition a revolving index drum provided with two scales, which indicate simultaneously in cubic feet and in therms, by means of a stationary pointer.

Distribution of Low-Grade Gas.—No. 184,820.

HELPS, G., of Nuneaton.

No. 5572; Feb. 18, 1921.

This invention refers to the distribution of low-grade gas—defined as a gas having a calorific value of 400 B.Th.U. By this invention the patentee claims that low-grade gas down to 250 B.Th.U., or thereabouts, may be distributed through existing mains at the same initial pressures, or something like, as at present used with 550 B.Th.U. or higher quality, and such pressure will in the majority of cases, if not in all, give equal service in the form of heat units contained in completely combustible mixtures of gas and air at the burner head.

There is claimed, in the distribution of a low-grade gas, the combination of means for supplying to existing gas-mains at the usual initial pressure a gas of low calorific value, with consuming appliances the orifices of whose nipples are larger than usual, and vary approximately inversely as the calorific value of the gas.

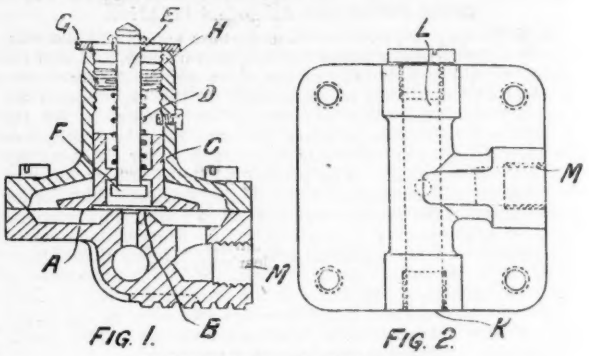
Safety Cut-Out Device.—No. 184,940.

KEITH AND BLACKMAN CO., LTD., and KEITH, G., both of Farringdon Avenue, E.C., and POINTON, J. E., of Peterborough.

No. 16,824; June 20, 1921.

This invention relates to the type of safety cut-out device for use on gas-supply systems which is normally held open by gas pressure acting on the under side of a diaphragm valve against the action of a spring, but which, when closed, can only be reopened on actuation of a manually operable lifting device.

In the accompanying drawings, fig. 1 is a vertical section of a device according to the invention, and fig. 2 is an inverted plan of the lower half of the valve casing. A denotes a diaphragm, preferably of thin metal, held in a diaphragm casing, the diaphragm itself forming a valve which closes on to a central seat B of small area compared with the area of the diaphragm. The diaphragm is urged towards its seat by a spring D acting on a plunger C movable in the upper half of the diaphragm casing. For lifting the diaphragm off its seat, there is provided a spindle E having a head F engageable with the plunger C and operative to lift the plunger upwards, but inoperative to press it downwards. The upper end of the spindle E is fitted with a washer G retained in place by a split pin passing through the spindle. H denotes a bush adjustable to regulate the compression of the spring D; the bush being split transversely and sprung so that it is not liable to change its position in the diaphragm casing in consequence of vibration. A pronged key effects the adjustment of the bush; the prongs being adapted to pass through holes in the washer G.



Keith's and Pointon's Cut-Out Device.

Gas is admitted to the centre of the valve seat B by way of either of the inlets K and L, whichever is more convenient. So long as the diaphragm is held on to its seat, the high pressure within the range of operation of the apparatus is unable to lift the diaphragm, due to the small area against which the gas is pressing. If, however, the diaphragm be lifted off its seat by manual operation of the spindle E, high pressure is established underneath the diaphragm, which latter will be held-up, permitting the gas to flow to the outlet M, until the pressure has again fallen to a predetermined point.

Back Plates for Gas-Cookers.—No. 184,973.

FLETCHER, RUSSELL, & CO., LTD., and MILLS, J. W., both of Warrington.

No. 19,205; July 16, 1921.

This invention has reference to back splash-plates for gas and like stoves, of the kind in which a plate pivotally mounted on the stove is adapted either to be turned up to form a splash-guard or turned down on the hotplate to form a table and a cover for the burners. The object is to improve such splash-plates and the method of mounting them.

The plate has at its lower edge pivots working in lugs on an upright framework; one lug being opened at one side to enable the splash-plate to be lifted free. In its upright position, the plate is restrained by a turn-button. It is enamelled on both sides, and may have its edges upturned to prevent articles slipping off when it is in use as a pastry board.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Sept. 20.]

Nos. 24,506 to 25,141.

ADORNI, U.—"Differential valves for cylinders of compressed gas" No. 24,784.
BRIDGEFORD, P. S.—"Inverted burners for gas, &c., lighting." No. 24,535.
BROADHEAD, R. W.—"Manufacture of gas." No. 24,961.
CARPENTER, C.—"Gas-meters." No. 24,827.
DEMPSTER & SONS, LTD., R.—"Regenerator furnaces." No. 24,743.
DEMPSTER & SONS, LTD., R.—See Broadhead, R. W. No. 24,961.
EYLES, A. E.—"Pressure and flow indicators." No. 24,793.
FENTON, C.—"Automatic gas-lighters." No. 24,698.
GALLOWAY, H.—"Pipes for use when immersed in chemical liquids." No. 24,974.
GIBSON, J. M.—See Galloway, H. No. 24,974.
HELPS, G.—"Gas-stoves, &c." No. 24,507.
JUDSON, F.—See Galloway, H. No. 24,974.
LAGUESSE, E.—"Safety locking-device for valves controlling pipe-lines." Nos. 25,037, 25,038.
MAJOR, P. F. E.—"Coin-freed meters, &c." No. 24,992.
MILES, G. H.—See Major, P. F. E. No. 24,992.
MITCHELL, W. A.—"Pipe connections and couplings." No. 24,917.
PRINCE, J. E.—"Pipe-joints." No. 24,759.
ROOTS, J. D.—"Gas generator." No. 25,140.
ROSS, R. C.—See Mitchell, W. A. No. 24,917.
ROTHERHAM, K.—See Eyles, A. E. No. 24,793.
ROWELL, J. & R. H.—"Portable gas, &c., heat-radiating apparatus." No. 24,932.
ROXBURGH, A. B.—See Rowell, J. & R. H. No. 24,932.
RUTHERFORD, R.—"Automatic gas cut-off devices." No. 25,095.
SHAW, H. S. HELE-.—"Valves." No. 25,119.
SMITH, C. C.—See Major, P. F. E. No. 24,992.
SUTCLIFFE, E. R.—"Apparatus for distillation of carbonaceous substances." No. 24,624.
TOOGOOD, H. J.—See Dempster and Sons, Ltd., R. No. 24,743.
WEYMAN, G.—"Treatment and transportation of ammonium sulphate." No. 24,788.
WEYMAN, G.—"Drying ammonium sulphate." No. 24,941.
WEYMAN, J. E.—See Weyman, G. No. 24,788.
WINAND, F.—See Laguesse, E. Nos. 25,037, 25,038.
WRIGHT, A. G.—"Gas-meters." No. 24,509.

MISCELLANEOUS NEWS.

PROF. SMITHELLS ON THE THERM.

Designed to the Public Advantage.

Some remarks on the therm question by the Engineering Correspondent of the "Yorkshire Post" induced Prof. Arthur Smithells to address a letter to the Editor of that paper offering "some testimony on the subject, in view of the storm which has been raging in a section of the London Press." In a leading article our contemporary says that the position of those gas companies who have adopted the method of charging by therms instead of by cubic feet receives valuable support from this letter by Prof. Smithells, who, "as Professor of Chemistry in Leeds University, will be recognized as an expert on the technical aspect of the question, and he was also closely concerned with the practical proceedings which led up to the introduction of the new measurement. There can, further, be no doubt that his testimony is entirely disinterested."

This is what Prof. Smithells had to say:

> What a therm is, and why it was introduced as a measure of the value of the gas—these points are clearly explained by your correspondent. All that I have to add is that I took part in the proceedings relating to the introduction of this new system of measurement, being one of a small group of men who met occasionally in private conference under the leadership of the late Lord Moulton, during the critical days of the war. I commit myself without the least hesitation to the positive statement that the change which has been made was designed to the public advantage.
>
> I will not enter upon details, but would recall one interesting incident. When we were discussing the proposed change, a leading and far-seeing member of the gas industry asked us to consider well what to him was the chief danger of the new system—namely, that just because it was "new" it would inevitably be seized as a weapon by ill-informed or unscrupulous people who, for any cause whatever, wished to assail the gas industry. While we agreed with this opinion, it was decided to persevere in the belated reform to which we had set our hand. I do not know that any of us foresaw the extent to which the truth would be perverted, or how perfectly the therm would subserve the purposes of that particular form of commercial enterprise known as a newspaper "stunt." If this had been fully foreseen, I think it possible that more precautions against it might have been taken. But I am equally sure that those who had the public interest at heart would have been undaunted in pressing for the change.
>
> Lastly, may I be allowed to say this? I have long been interested in the gas industry, have received many compliments from it, and took some part in inducing it to found a Chair in the University of Leeds. I shall therefore, no doubt, to many people be regarded as a hopelessly prejudiced witness. It is for this reason that I have not tried elsewhere to intervene publicly. But I am hopeful that in the district where I am best known this protest against a scandalous misleading of the public may have a little weight, and, among other things, may help to relieve those who are in the extraordinary position of not daring to put into operation a great public benefit because of a greater public scare.

The Engineering Correspondent in his note also emphasized the fact that the change-over to the therm was made solely in the interests of the consumers, and not to favour the makers of gas. "As a matter of fact," he concluded, "payment by calorific value is, in several ways, more satisfactory than payment by volume. In the old flat-flame burner days, gas had, by Statute, to be of not less than a specified illuminating power; but, then, it was light which was required, not the capacity for heating, for, comparatively speaking, but little gas was used for heating or cooking. Nowadays, with the introduction of the gas-mantle and the enormous growth in the consumption of gas for cooking and heating, and in manufacturing processes, it is the calorific value of a gas which is its most important attribute. In any case, the public is not being 'done' when it is asked to pay by the therm." Reference is made to the foregoing in our editorial columns to-day.

PRESCRIPTION OF THE GAS REFEREES WITH REGARD TO TESTING.

The following notice has been issued by the Gas Referees to undertakings in respect of which Orders have been made by the Board of Trade under section 1 of the Gas Regulation Act.

LIST OF FITTINGS AND APPARATUS ORDINARILY REQUIRED FOR TESTING UNDER THE GAS REGULATION ACT, 1920.

One service-pipe.

"Each testing place shall be connected with the main or mains specified by the Gas Referees in their prescription by a service-pipe or service-pipes of not less than three-quarters of an inch internal diameter, which pipe or pipes shall be laid with a continuous fall towards the main and without tap, branch, or provision for connection of any kind between the main specified and the tap controlling the testing apparatus. The service-pipes shall be extended beyond the testing apparatus to a burner or burners readily accessible to the gas examiner, at which gas may be burned at a rate of not less than 10 c.ft. per hour."

(A second independent service-pipe, connected in like manner, may be provided for pressure testings, in any testing place, and must be provided in testing places for which a recording calorimeter is prescribed.)

One T-piece for fixed pressure-gauge (with tap).

One U-tube pressure-gauge to contain water, of which the scale extends to the highest pressure at which gas is supplied by the undertaking.

One main control tap.

One service governor to be so loaded that the water-gauge pressure of the gas passing to the calorimeter and purity testing apparatus does not exceed 2 in.

One T-piece for connection with tap to sulphuretted hydrogen test apparatus.

One sulphuretted hydrogen test apparatus.

One T-piece for connection with tap to experimental meter of calorimeter.

One experimental meter, one-twelfth cubic foot per revolution with cased thermometer. (See below as to the verification of this thermometer.)

One three-way tap on inlet of experimental meter (for proving the meter with one-twelfth cubic foot measure).

One Boys' non-recording calorimeter, with thermometers and accessories.

The calorimeter itself, if new, should be sent to the Gas Referees' office by the makers for certification before dispatch. In all cases the following parts and accessories of the calorimeter must be sent to the Gas Referees' office for certification.

Two long thermometers, about 0° to 50° C. graduated in tenths, for which the Referees give a certificate, showing the corrections to be applied at different parts of the scale.

Two short thermometers, about 30° to 90° Fahr. in single degrees, for reading the temperature of the air and of the effluent gases. For these the Referees give a certificate, stating that they are correct. If there is an appreciable error, thermometers of this class are rejected, and others must be supplied.

One cased meter thermometer, which may be verified by the gas examiner by comparison with one of the certified calorimeter thermometers, or will be certified as correct by the Gas Referees if it is sent to them.

One water measuring vessel or cylinder, graduated in 10 c.c. markings from 1600 to 2400 c.c. or from 1700 to 2500 c.c. The Referees mark and number this vessel as evidence that they have certified it as correct.

One one-twelfth cubic foot measure for proving the meter. The Referees mark and number this vessel as evidence that they have certified it as correct. (The glass portion only of this measure is required for certification.)

The Gas Referees are prepared to examine and certify one spare set of the foregoing thermometers and measures in respect of each prescribed testing place. The items of the spare set may be used by the staff of the gas undertaking with any calorimeter, but must be placed immediately at the disposal of the official gas examiner in the event of breakage or loss of the corresponding items of the official set.

(No balance governor or hygrometer is required.)

The service-pipe shall be extended beyond the testing apparatus to a burner or burners readily accessible to the gas examiner, at which gas shall be burned during the test at a rate of not less than 10 c ft. per hour, as determined by the rated capacity of the burner or burners, and the gas examiner shall see that the gas is burning at such burner or burners at not less than that rate for a period of at least 45 minutes before he makes the first reading of any testing of calorific value, or for a period of at least 30 minutes before he tests for purity. These burners must be so placed that they do not heat the meter or other apparatus used in testing.

One clock with seconds hand, or stop-watch or clock.

One barometer, which in the case of testing places for undertakings making more than 100 million c.ft. per annum shall be a standard mercury barometer, but in the case of smaller undertakings may instead be a good aneroid, with scale divided to 1-50th in.

One U tube pressure-gauge, portable, to contain water, of which the scale extends to the highest pressure at which gas is supplied by the undertaking.

One set of pliers and other tools likely to be required by the gas examiner in attaching the pressure-gauge to lamp columns, &c.

One ladder (for use by the gas examiner when taking pressures at lamp columns).

One pressure register (when specifically prescribed by the Gas Referees).

The Boys non-recording calorimeter, in which there are no proprietary rights, is supplied, *inter alia*, by the following firms.

Messrs. J. J. Griffin and Sons, Kingsway, London, W.C. 2.

Messrs. Wm. Sugg and Co., Ltd., Ranelagh Works, Chapter Street, Westminster, London, S.W. 1.

Messrs. Townson and Mercer, Ltd., No. 34, Camomile Street, E.C.

Messrs. Alexander Wright and Co., Ltd., No. 1, Westminster Palace Gardens, Artillery Row, Victoria Street, Westminster, London, S.W. 1.

APPARATUS SENT FOR CERTIFICATION.

The Gas Referees cannot take responsibility for the return of corks attached to thermometers, or of spirals, &c. The corks have to be removed from the thermometers in the examination of the latter, and are frequently broken or otherwise rendered useless in such removal.

Imperial Continental Gas Association Award.—The City Notes of "The Times" last Wednesday contained the following: We understand that the Imperial Continental Gas Association are still waiting for the Public Trustee to hand over the sum of £1,550,000 which it was agreed, as the result of a compromise, should represent a final settlement of their German claims. Pending the ascertainment of the general result of the realization of German property in this country, which the Public Trustee is at present effecting, no distribution, it is stated, will be made in respect of agreed claims, which, like the £1,550,000 above referred to, rank for settlement under Article 297c of the Treaty of Versailles. Until the money is received, together with a detailed statement as to its allocation between capital and income, no definite scheme can be formulated for its distribution among stockholders.

GAS REGULATION ACT APPLICATIONS.

The following further notices have appeared in the "London Gazette" regarding applications to the Board of Trade for Orders under the Gas Regulation Act.

SPECIAL ORDER.

Colwall Gas Company, Ltd.

The Company are intending to apply to the Board of Trade for a Special Order under section 10, to make provisions with regard to charges for, and supply of, gas.

DECLARATIONS OF CALORIFIC POWER.

Croydon Gas Company.—500 B.Th.U., in substitution for 470 B.Th.U. (Jan. 1, 1923.)

Launceston Gas Company, Ltd.—500 B.Th.U. (Oct. 1.)

Lewes Gas Company.—500 B.Th.U. (Sept. 29.)

Newport Pagnell Gas and Coke Company, Ltd.—500 B.Th.U. (Sept. 30.)

Pudsey Coal Gas Company.—540 B.Th.U., in substitution for 500 B.Th.U. (Jan. 1, 1923.)

Ripley Gas Company, Ltd.—450 B.Th.U. (Dec. 12.)

GAS REGULATION ACT ORDERS.

There have been received from the Director of Gas Administration copies of the following further Orders made by the Board of Trade under section 1 of the Gas Regulation Act.

Staveley Gas Light and Coke Co., Ltd.

After the declared date, the standard price in respect of gas supplied by the undertakers shall be 16·2d. per therm.

For the purpose of ascertaining the authorized rate of dividend, any price charged per 1000 c.ft. before the declared date shall be rendered into the equivalent price per therm by dividing it by five.

Prepayment meter clauses are included. (Sept. 18.)

GAS HEATING LECTURE AT NEWCASTLE.

The Newcastle and Gateshead Gas Company arranged a meeting of their staff last Friday evening to hear a lecture on "Gas Heating," by Mr. Hamilton Davies, of the Technical Staff of Radiation, Ltd. There was a large and keenly interested audience, consisting of the commercial staff, inspectors, and men of the distribution department presided over by Mr. A. B. Roxburgh.

Mr. Davies described the desirable qualities that any heating agent must possess, such as the capability of giving radiant heat at short notice, and being able to deal immediately with the variations of the British climate. He dealt briefly with the communal advantages of gas heating, and gave convincing figures, taken from authoritative reports, of the extent of the damage done by smoke from the domestic chimney, and emphasized the importance of satisfying the requirements of hygiene and ventilation. Mr. Davies then explained in detail the construction of the modern Radiation gas-grate, laying special stress on the radiants, the silence of the fire when in use, the burner, and the gas adjuster, with its combined calorific value and pressure regulator; pointing out that these have been designed to be used under the varying conditions found throughout the country, and that the injector burner and radiants would give the desired results with gas from 350 B.Th.U. per cubic foot upwards. The lecturer then contrasted the modern gas-grate with the old type, from the point of view of ventilation. He showed conclusively that the patent injector-ventilating principle ensured not only warmth, but perfect ventilation of the room; the air being drawn from all parts of the apartment well above the floor level, and involving no floor draughts. It was largely owing to the invention of the ventilating fire that the medical profession had become converted, and now acknowledged that the gas-fire, which for many years had been recognized as convenient, was thoroughly healthy.

LONG SERVICE RECOGNIZED AT BATH.

At the Board meeting last Wednesday of the Bath Gas Company, three employees whose combined services total 153 years, received interesting gifts from the Directors. The three recipients were Mr. Thomas Alexander, outdoor superintendent, Mr. John Bally, painter, and Mr. Richard Smith, labourer. Mr. Alexander, who is 64 years of age, joined the Company in April, 1870, over 52 years ago; Mr. Bally, who is 76 years of age, joined the Company in January, 1871, over 51 years ago; and Mr. Richard Smith joined the Company in August, 1872, so he has over 50 years to his credit. All three are still employed by the Company.

Sir Percy Stothert (Chairman) made the three presentations in fitting terms. He referred to the long and faithful service rendered to the Company by the recipients. Their long periods of service showed the good feeling that existed between the employer and employed, which they were all anxious to maintain. Their long service showed, too, that their occupation was not so unhealthy as some imagined. It was pleasing to know that the Company had quite a number of men who had completed over 40 years' service.

Mr. Alexander received a solid silver teapot, while Mr. Bally and Mr. Smith were presented with armchairs.

Deficit at Inverness.—The financial year of the Inverness Gas Department closed with a debit balance of £2900. The gross revenue amounted to £35,167. There will be no change in the price of gas.

BRITISH GAS LIGHT COMPANY, LTD.

Directors' Report.

In presenting the accounts for the year ended June 30 at the meeting of proprietors to-day (Wednesday), the Directors will report that, after providing for interest on debentures and debenture stock, the net revenue amounted to £67,339, which, with the undivided balance brought forward from the preceding year, left an available balance of £124,097. From this sum the Directors have paid the dividend at the rate of 7 p.ct. per annum on the cumulative preference shares, and an interim dividend at the rate of 5 p.ct. on the ordinary shares, and have transferred the sum of £15,000 to the general reserve fund (London). They now recommend that the payment of the above dividends be confirmed, and that a final dividend on the ordinary shares at the rate of 5 p.ct., making 10 p.ct. for the year, also a bonus of 2s. 6d. per share, both less income-tax, be paid on Oct. 6. The dividend and bonus will amount to £23,245, and leave a balance of £58,983 to be carried forward.

The total quantity of gas sold has increased by 2·39 p.ct. on the sale for the year to June, 1921. At the two principal stations of the Company the year's results have been eminently satisfactory. Orders under section 1 of the Gas Regulation Act, 1920, have now been granted by the Board of Trade for Trowbridge and Holywell, and gas is being sold at those stations on the therm basis.

At a special general meeting held on April 5 last, a Bill promoted by the Stoke-on-Trent Corporation to acquire the Company's Staffordshire Potteries undertaking was submitted to the shareholders, and unanimously approved by them. The Act received the Royal Assent on May 31, and on June 30 the Potteries station was transferred to the Corporation. On that day, under the terms of the agreement scheduled to the Act, the Corporation paid to the Company the sum of £345,000 in cash, and assumed liability for the Potteries mortgage debentures of the Company amounting to £40,000. A further payment by the Corporation is due to the Company of approximately £60,000.

THERMS AND THE LONDON BOROUGHS.

An Inquiry by the "Daily Telegraph."

In the "Daily Telegraph" for Tuesday of this week, an article appears on the dual subject of "London Rates and the Therm Question." Our contemporary, in this article, makes a comparison of the new rates with the old rates, which shows considerable reductions. In connection with this matter, they have instituted inquiries in the boroughs with regard to the subject of the charges for gas; and reading the various reports, it is obvious that discontent over the question is not by any means universal, but very largely local. There seems to be an indication, too, that the trouble is somewhat more intense in those boroughs possessing electricity supply undertakings. We give a few of the extracts from the reports regarding the inquiries made.

Camberwell.—The introduction of the therm system by the South Metropolitan Gas Company has never, it is stated, been popular with either the business people or the householders. The system is felt by many to be a complicated and unsatisfactory method, and there is a widespread desire that it should be replaced by the old cubic feet system. Consumers complain that they are charged more for their gas; and they object to the difficulty experienced in checking gas bills.

Chelsea.—It is reported that "no cause for complaint has arisen in connection with the introduction of the therm system of gas supply, the cost comparing reasonably with that under the old method."

Finsbury.—Finsbury is supplied with gas by the Gas Light and Coke Company. In the quarter ended June, 1921 (the last quarter under the cubic feet system), the charge was 4s. 8d. per 1000 c.ft.—1000 c.ft. being equal to 5 therms. On the introduction of the therm system in the next quarter the price jumped up to 13·2d. per therm, equal to about 5s. 5d. per 1000 c.ft. At the present time the charge per therm is 11d., equal to 4s. 7d. per 1000 c.ft.

Islington.—Gas is supplied to the Council by the Gas Light and Coke Company. The cost of gas supplied for the public lamps, &c., is not materially affected by the change-over from the cubic feet to the therm system of measurement. There is a general impression among private consumers, however, that their gas accounts have, under the therm system, increased by about 12 p.ct., some consumers putting it at a higher percentage even than this.

Kensington.—Gas charges under the therm system are reported to be the cause of a great deal of indignation among the traders and private householders of the borough. The local Chamber of Commerce has invited Mr. F. W. Goodenough, of the Gas Light and Coke Company, to address them on the subject, and he has agreed to do so next Monday. With regard to the gas supplied for works and services under the control of the Council, the difference in the charges under the two systems is not great. The therms per burner consumed during the last June quarter were equivalent to 2471 c.ft., comparing with 2500 c.ft. in the June quarter of 1910. These figures would indicate that the advantage lies with the therm system; but it is also pointed out that the governors now in use are more economical.

St. Pancras.—Complaints regarding the cost of gas under the therm system are reported to be general in the borough, and Alderman F. L. Coombes, a Labour member of the Council, has tabled the following motion: "That owing to the very widespread dissatisfaction felt by the people of this borough, by reason of the costly charges for gas, this Council requests the Mayor to convene a town's meeting at which the matter may be discussed and suitable resolutions moved thereon."

Woolwich.—The cost of gas in the borough does not seem to be very different under the therm system from what it was under the old cubic feet system of measurement.

Pending some definite decision as to a proposed electric lighting scheme, the Coleraine Urban Council Gas Committee recommend the postponement of the installation of vertical retorts at the gas-works.

NOTTINGHAM GAS UNDERTAKING.

Opportunity was afforded last Friday to members of the Nottingham Corporation for a general inspection of the principal works which constitute the city's gas undertaking, the tour supplying ample evidence of the efficiency with which the concern continues to be maintained. For years ratepayers have had adequate reason for satisfaction with the substantial aid in relief of local burdens derived from the profits of the undertaking, which has been conducted with consistently remunerative results. These profitable results have not been attained at the sacrifice either of mechanical efficiency or methods of sound finance; for while the works have been maintained at a high standard, adequate means have been adopted for the cancellation of stock and the building-up of a special renewals account and reserve fund.

Friday's itinerary included an inspection of the three carbonizing stations at Basford, Radford, and the Eastcroft, with an incidental visit to the depôt on Woodborough Road which serves the purpose of a showroom for lighting, heating, and cooking appliances, as well as workshops for the meter-constructing staff. Those who participated, under the guidance of Mr. John Wilkinson (the Engineer and General Manager), in a round of inspection replete with technical interest, were the guests of the Gas Committee at luncheon, when, in proposing the health of the Chairman (Alderman Albert Ball), Mr. Gover Ford (the Vice-Chairman) referred to the conspicuous ability with which Mr. Ball had for years conducted the important work connected with the undertaking. It was inevitable that much should be said in the course of the proceedings regarding the therm question, which had given rise to a great deal of controversy locally, as elsewhere; and in this connection the Chairman did not hesitate to express the view that people had been talking a lot of nonsense about the matter. The possession of the gas undertaking had proved an invaluable advantage to the Municipality; and it might well be said that, when their forefathers acquired it, they acted wisely. He concluded by paying a cordial tribute to the efficiency of the work of Mr. Wilkinson and his staff, upon whose behalf the compliment was acknowledged by Mr. Wilkinson. The Sheriff of the City (Mr. A. Parkes), a member of the Gas Committee, also spoke in strong defence of the therm system.

CHESTERFIELD GAS INQUIRY.

Mr. R. C. Cox, an Inspector of the Ministry of Health, conducted an inquiry at Chesterfield on Tuesday of last week into an application by the Corporation for sanction to borrow £29 567 in connection with the gas undertaking.

The Town Clerk (Mr. J. H. Rothwell), in explaining the application, said a considerable proportion of the expenditure had been already made, though it was not the practice of Chesterfield to incur unauthorized outlay. They, however, asked for the acceptance of his explanation that the position had arisen through peculiar circumstances which prevailed in Chesterfield at the time the expenditure was incurred. In consequence of Newbold and Whittington being included in the borough, together with delay in taking over the accounts of the Chesterfield Gas and Water Board, some difficulty arose before the financial position of the concern on March 31, 1921, could be ascertained. At that time the Ministry of Health were pressing the Corporation to lay gas-mains on the housing estate, and most of the expenditure was in connection with this. The balance of the expenditure was on the water-gas plant. This was also unavoidable, as the consumption of gas had increased from 201,900,000 c.ft. in 1914 to 320,488,000 c.ft. in 1922. The Corporation had met the increased demand; but they were unable to pursue the policy of the Gas and Water Board, who met as far as possible capital charges out of revenue. Not only had the Corporation to provide for these extensions, but they had had to find the money for repairs that were deferred following upon war restrictions. They did the work without losing much time, owing to the Ministry's guarantee of 20 p.ct. of capital expended on gas-mains laid in housing areas. They were, however, not asking for a penny, because the work was carried out so promptly that the revenue exceeded the outlay, and there had consequently been a saving to the Ministry. He foreshadowed an application to the Ministry later on for permission to borrow a further sum of £2359, to meet the excess expenditure incurred in 1921.

The Gas Engineer (Mr. H. Davies) explained that the Whittington works were capable of producing 60,000,000 c.ft. per annum, but these works were not at the present time in operation. The Committee found they could produce gas cheaper at the central works, though they intended to utilize the retorts at the Whittington works during the winter months. The Gas Committee had in view a scheme of extension to the coal-gas plant.

There was no opposition to the application.

Ashbourne Gas Undertaking.—It was announced at a meeting of the Ashbourne Urban District Council that the Ministry of Health had sanctioned the borrowing of £12,000 for extensions and improvements at the gas-works; and this sum it was decided to borrow from the Royal Liver Friendly Society at 4½ p.ct., to be repaid in thirty years. The Gas Manager reported that during the past six months the working of the undertaking had been very satisfactory.

A Therm Inquiry Asked for.—It is reported in the "Daily Mail" that the Slough Urban District Council have decided to ask the Board of Trade to hold an inquiry into the therm system of charging for gas. The discussion at Slough, it is added, arose out of a letter from Mr. W. A. Lidstone, a former councillor, who wrote: "My gas bill in one quarter has increased somewhere about £1 on every £3 I paid previously. This sum represents a penny more in the cost of cooking each of 2059 dinners." Mr. Robinson said that, whereas the price of gas was 4s. 5d. per 1000 c.ft., now it is 1s. 3d. a therm, which works out at 6s. 3d. per 1000 c.ft. Subsequently the "Daily Mail" stated that the Board of Trade had decided to hold an inquiry, but this was officially denied last week-end.

HEBDEN BRIDGE GAS BOARD.

The annual report of the Hebden Bridge and Mytholmroyd Gas Board, which has just been approved, states the gross profits for the past year's working at £1862. After making the necessary allowance for interest and sinking fund, however, there is a net loss of £2830, which compares with a loss of £417 for the previous year. The amount of stock issued and capital borrowed is now £109,445, and towards the liquidation of this sum £54,137 has been set aside.

At the meeting of the Board, the Chairman (Mr. A. Sutcliffe) said that the coal strike last year had cost the undertaking about £4000, owing to poor quality coal having to be bought at exorbitant prices, in order to keep the town supplied with gas. The total output of gas for the year (103,701,000 c.ft.) showed an increase of 3,661,000 c.ft. The leakage at 8·2 p.ct. was 1·5 p.ct. higher, but this was accounted for by the higher pressure. The Ministry of Health had given consent to the sinking fund charges being suspended for five years, to £6000 being borrowed for the vertical retorts, and £551 for a new tar and liquor tank. He thought the outlook was brighter, and, in spite of the adverse balance-sheet, was in favour of a reduction in the price of gas.

It was decided to reduce the price 3d. per 1000 c.ft. all round, making the charge for ordinary consumers 5s. 3d. per 1000 c.ft.

AUSTRALIAN GASLIGHT COMPANY.

The Annual General Meeting was held in the Company's Lecture Hall, Haymarket, Sydney, on Aug. 10—Mr. GEORGE J. COHEN (the Chairman) presiding.

The SECRETARY (Mr. C. U. B. Gurnett, A.C.I.S.) submitted the report and presented the audited accounts for the half year ended June 30. The report stated that the net profit for the half year, including the balance brought forward, amounted to £125,466. The Directors recommended the payment of a dividend for the six months of 4 p.ct. on the old "A" and "B" shares, and in proportion on the new "A" shares, which would absorb £87,523, and leave £37,942 to be carried forward.

The CHAIRMAN, in moving the adoption of the report and accounts, said the satisfactory growth of business previously experienced had continued during the past six months, in which, however, a record was established, in the delivery of the largest quantity of gas in any one day—21,520,000 c.ft. The Company's works were the biggest south of the Line; but a surer indication of growth might be found in the fact that, while the gas sold in 1890 amounted to 1107 million c.ft., the total sales during the twelve months ended June last reached 5306 millions. The gas sold during the past six months amounted to 2,572,047,000 c.ft.—an increase of 5 p.ct. over the corresponding period of last year; while the gas consumers now numbered 170,231, showing a net increase of 3400. A decrease of 1d. per 1000 c.ft. in the price of gas which came into operation on May 1 last was followed by a reduction of 2d. as from Aug. 4. The net revenue from residuals showed a falling-off in comparison with the figures for the corresponding period; but the only substantial decrease occurred in sulphate of ammonia, which had been subject to the variations in market conditions. The Company, together with other sulphate producers throughout the Commonwealth, had embarked upon a propaganda movement which, in the first year of its operation, had considerably increased the local use. It was the view of the Company's officers that this local use would be substantially increased in the future, and that in course of time there would be no need whatever to depend upon the export demand. In the past year the Company had not been able fully to meet the demand for distilled tar, and very little tar had been used in the crude form. As a result, they had recovered large quantities of benzole, motor spirit, solvent naphtha, and disinfectant oils and tar fuels, which they had been able to dispose of profitably. This departure represented a solid advance in Australian industry, and served to emphasize the absolute necessity for proper utilization of the fuel resources of the country. The programme of extensions to the works plant at Mortlake was being satisfactorily carried out. It was confidently anticipated that the installation of vertical retorts now in course of construction would be ready for commission before the end of the year, and good progress was also being made with other sections of the new plant. The reconstruction of No. 2 gasholder was completed, and it would shortly be put into use. This reconstruction was the largest job of its kind undertaken in Australia; and as the actual work had been entirely carried out locally, it reflected great credit on those concerned. The reconstruction of No. 1 gasholder would shortly be entered upon. It was the policy of the Directors to decentralize the storage of gas from the Mortlake works as occasion arose, and to instal holders and boosting plants in various parts of the area of supply. Only thus could the ever-increasing demand for gas in such an enormous area as that supplied by the Company be satisfactorily met. A reduction of wages to the extent of 1s. per day came into operation from the beginning of February last, and a further reduction of 10d. per day on Aug. 1. Both these reductions automatically arose from the terms of the agreement entered into with the Union at the beginning of 1920. The application of the Company's employees for the granting of a 44-hour week was considered by the Special Court and granted, and the 44-hour week became general in the industry on April 10. It was noted with gratification that a reversion to the normal week of 48 hours might soon be in operation. The reduction in wages, *plus* the anticipated increased return from the reintroduction of the 48-hour week, had encouraged the Directors to declare the further reduction of 2d. per 1000 c.ft. already mentioned.

The report and accounts were adopted, the dividend was agreed to, and a hearty vote of thanks was accorded the Directors and officers for their efficient management of the business during the half year.

South Australian Gas Company.—The Company, who supply Adelaide with gas, made a profit of £60,505 on the working of the year ended June 30; and after the payment of the dividend recommended, there remained a balance of £3258 to be carried forward.

GAS OR ELECTRICITY FOR CLOCK LIGHTING.

Great Advantage of Gas in Cost.

The Highways Committee of the Lambeth Borough Council reported, with reference to a question raised at the last meeting of the Council as to the lighting of the clock at the Stockwell War Memorial, that estimates had been obtained from both the South London Electric Supply Corporation, Ltd., and the South Metropolitan Gas Company, for the installation, maintenance, and automatic lighting and extinguishing, in accordance with the recognized hours obtaining in the borough. These estimates were as follows:

South London Electric Supply Corporation, Ltd.

Installation	£30 0 0
Supply of current on annual consumption of 2560 units at 6d. = 4000 lighting hours (NOTE.—A meter will be fixed to record this consumption, and variations of the amount of current consumed would be debited or credited as the case might be.)	64 0 0
Attendance to clock control	1 0 0
Annual charge	£65 0 0

Exclusive of new lamps and also repairs to the installation, should they become necessary.

South Metropolitan Gas Company.

Supply and fix the necessary fittings and connections for lighting and automatically controlling the illumination of the clock for the sum of	£10 0 0
Charge for gas and maintenance per annum	£20 0 0

The installation will be clock controlled.

In view of the difference in cost, the Committee consider that the latter method should be adopted by the Council.

FIRE AT THE DAVIS COMPANY'S WORKS.

On Saturday afternoon, the japanning shop at the Diamond Foundry of the Davis Gas-Stove Company, Ltd., Luton, was destroyed by fire, which has caused a dislocation of work at a very busy time. The fire broke out just before 4 o'clock through a bucket of the highly inflammable liquid, which was being heated in an iron receptable by gas, spilling-over and igniting. After vainly endeavouring to extinguish the fire with sand, a workman who was in the shop gave the alarm, and the Luton Fire Brigade, together with the works brigade, was summoned.

As this shop is regarded as the danger zone of the works area, every precaution had been taken to minimize the risk of fire and to localize it in the event of an outbreak. The shop is so situated that firemen were able to play on the flames from three different points. The asbestos walls stood the test, but all the woodwork and stock in the room were destroyed. The two brigades did their work well, and all danger was over at 6 o'clock.

The fire has disarranged work for a few days; but it being essential to cope with a large number of orders, Mr. Harold Davis put the work in the hands of builders at once, and clearing operations were in progress the same evening. He hopes to have the department at work again next Monday. The damage may be covered by a few hundred pounds, but it is impossible, at the moment, to estimate this with any degree of accuracy.

TRADE NOTES.

Sugg Lamps.

The new edition of their No. 11 catalogue of lamps and fittings has now been issued by Messrs. William Sugg & Co., Ltd., of Ranelagh Works, Chapter Street, Westminster, and a copy will be sent free, on application, to any gas undertaking which may not have received one. The firm's speciality this season for indoor lighting is polished aluminium, with "Vitreosil" ware, which form an extremely pleasing, as well as highly serviceable, combination. Particulars and illustrations of lamps and burners of this character—for example, the "Surbiton," "Esher," and "Elite"—will be found in the number of the "Gas Salesman" which is included with this week's issue of the "JOURNAL," and to that article readers may be referred. For outdoor low-pressure lighting, Messrs. Sugg have found nothing to surpass their well-known and deservedly popular "Littleton" lamp. The "Vitreosil" silica ware is supplied in a number of patterns and several colours, information as to which will be found in the catalogue, together with many other things of use to lighting authorities.

Gas Price Reductions in Scotland.—The Largo and Lundin Links Gas Company, Ltd., are reducing the price of gas to all consumers by 10d. per 1000 c.ft. on Oct. 1; while the Kennoway and Windygates Gas Company, Ltd., are taking the same step on Oct. 31. Both Companies are under the same management.

Maryborough (Queensland) Gas and Coke Company, Ltd.—The profit for the half year ended June 30, after making provision for working expenses, bad debts, and all other charges, including depreciation, amounted to £1652. At the meeting, the Directors recommended the payment of the usual dividend at the rate of 6 p.ct. per annum (free of State income-tax), and that the balance of £415 be placed to reserve for renewals and contingencies.

CURRENT SALES OF GAS PRODUCTS.

Tar Products in the Provinces.

Sept. 25

The average values for gas-works products during last week were: Gas-works coal tar, 52s. 6d. to 57s. 6d. Pitch, East Coast, 92s. 6d. to 95s. f.o.b. West Coast—Manchester, 85s. to 87s. 6d.; Liverpool, 86s. to 89s.; Clyde, 88s. to 90s. Benzole 90 p.ct. North, 2s. to 2s. 1d.; crude 65 p.ct. at 120° C., 1s. 1½d. to 1s. 3d. naked at makers' works; 50-90 p.ct., naked, North, 2s. to 2s. 1d. Toluole, naked, North, 2s. to 2s. 3d. nominal. Coal tar crude naphtha in bulk, North, 8½d. to 9½d. Solvent naphtha, naked, North, 1s. 8d. to 1s. 10d. Heavy naphtha, North, 2s. to 2s. 1d. Creosote, in bulk, North, liquid, 6½d. to 6⅝d.; salty, 5½d. to 5⅝d. Scotland, 4⅝d. to 5d. Heavy oils, in bulk, North, 6¼d. to 6½d. Carbolic acid, 60 p.ct., 2s. to 2s. 1d. Naphthalene, £12 to £15; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 5d. per minimum 40 p.ct., purely nominal; "B" unsaleable.

FROM A MARKET CORRESPONDENT.

Bye-Products Trade.

Irregularity describes the tar products market at the moment. Inquiry for pitch is still very great, and from the East Coast reports are current of 95s. per ton having been paid just recently. There is reason to anticipate all-round advances up to about £5 per ton, as recently suggested in these columns. This is due to the fact that from the beginning of next year the available quantities are likely to be much below normal. The American demand for certain tar products also continues, and if America comes into the market for these products on the same scale as she has done for iron and coal, it is impossible to guess to what heights prices may advance. There has been extra demand for carbolic acid crystals, and 7d. per lb. is now being paid. Crude carbolic is also better at 2s. 1d. per gallon, although sellers are not very anxious to let the material go at this figure. Naphthalenes are steady at £17 for refined and £4 and £6 for crudes. There is no change in solvent and heavy naphthas, and the improved feeling in benzoles does not appear likely to be maintained, particularly in face of the 5½d. reduction in petrol announced this week. Creosote is very firm, and makers are looking for an improvement. The shortage of pitch, as foreshadowed above, must certainly be reflected in the values of this material. There is much timber coming from the Baltic at the moment; and this will produce an increased consumption of creosote to that experienced in recent years in this material. Cresylic acid is just firm; the prohibitive tariff of the United States on this material rather restricting business. In intermediate products business continues to be of small dimensions, although there are more inquiries on the market. Aniline oil is in small request at 1s. 1d. per lb., and aniline salt at the same price. Salicylic acid, technical grade, is 1s. per lb.; beta naphthol 1s. 5d. per lb.; and resorcin 5s. per lb.

Sulphate of Ammonia.

There is a fair home demand, and, as the result of recent sulphate exports, supplies are none too plentiful. It is fairly clear that English makers will have all their work cut out to supply the export market if they are at the same time to reserve sufficient for the use of the British farmer. On the other hand, in spite of the world-wide shortage of the production of this material, there is some possibility of Germany being in a position to supply sulphate of ammonia for export, if her own agricultural needs for nitrogen can be met by the importation of 200,000 tons of nitrate of soda which has recently been proposed. If this can be effected, the world-wide position in sulphate of ammonia will be somewhat altered.

Goole Gas Again Cheaper.—It has been decided by the Goole Urban District Council to reduce forthwith the price of gas by 3d. per 1000 c.ft., bringing it down to 5s. Six months ago a reduction of 6d. per 1000 c.ft. was made.

Tully Gas Plants in Japan.—The Kobe (Japan) Gas Company are now installing the fourth set of Tully gas plants, making 2,000,000 c.ft. per day in all. This plant is fully equipped with the most up-to-date improvements, and includes carburettor and waste-heat boilers.

Another Reduction in Price at Bath.—The Bath Gas Company announce that, after the reading of the meters for the current quarter, the price of gas will be lowered to 6d. per therm, from 6·6d. per therm, a reduction of nearly 3d. per 1000 c.ft. This is the second reduction the Company have made during the present year—from 2s. 10d. per 1000 c.ft. in January to the equivalent of 2s. 4·8d. per 1000 c.ft. now. The Company are thus now little above the pre-war price of 1s. 10d. per 1000 c.ft.

Bexhill Water and Gas Company.—The accounts which were submitted at the meeting on Tuesday of last week, which were for the half year ended June 30, showed a balance at credit of profit and loss account available for dividend of £8970. Out of this the Directors recommended a dividend at the rate of 4½ p.ct. per annum on the 1885 and 1892 capital and of £3 3s. p.ct. per annum on the 1896, 1901, and 1904 capital. This, with provision for income-tax, leaves £5697 to be carried forward.

Further Reduction at Plymouth.—There is to be another reduction in the price of gas for consumers at Plymouth and Stonehouse. As from Michaelmas, the charge will be reduced by the Plymouth and Stonehouse Gas Company by 1d. per therm (4½d. per 1000 c.ft.). The revised charges will be 8d. per therm for ordinary consumption (3s. per 1000 c.ft.) and 7 4d. per therm for engine consumption (about 2s. 9½d. per 1000 c.ft.). There will be a similar reduction for Plympton and other outlying districts.

Westminster Technical Institute.

The prospectus of the Westminster Technical Institute, Vincent Square, Rochester Row, S.W., for the session 1922-23, which opened on Monday of this week, shows that evening classes on a wide variety of subjects have again been arranged by the Principal, Mr. J. Stuart Ker, B.Sc. These include gas engineering, the lecturers in which are: Gas-fitting, Mr. D. J. Winslow; gas supply, Messrs. P. Smithers, W. Dieterichs, H. S. Tutton, C. Walker, and assistants; gas engineering and manufacture, Mr. F. White, B.Sc.; and gas-fitter apprentice classes, Messrs. R. Snell, M.A., and T. G. Ferne. The courses are divided up so as to meet the greatest possible number of requirements. The times of the lectures, syllabuses, &c., are set out in the prospectus. The Westminster Technical Institute is again this session to be the meeting place of the London and Southern District Junior Gas Association.

Kirkcudbright Gas Valuation.—An appeal was entered by the Town Council against the valuation for assessment of the Kirkcudbright Gas-Works, which the Assessor had fixed at £625 per annum. It was explained that the accounts showed a debit balance of £1200. The valuation was reduced to £150.

Cheaper Gas for Edinburgh.—The Edinburgh Gas Committee agreed to recommend the Town Council to reduce the price of gas at the beginning of next month by 4d. per 1000 c.ft., making the charge 4s. 3d. In December last the price was 5s. 8d. It is thought probable that a further reduction of 2d. per 1000 c.ft. will be brought into force in January.

New Holder for Buckie.—There has been erected at the works of the Buckie Gas Light Company, at a cost of £10,000, a new holder of a capacity of 250,000 c.ft. It has three lifts, and is spiral guided. Messrs. Henry Balfour and Co., Ltd., of Leven, Fife, were the contractors. In 1902, the Company sold 3½ million c.ft. of gas, whereas last year the output was 25 millions.

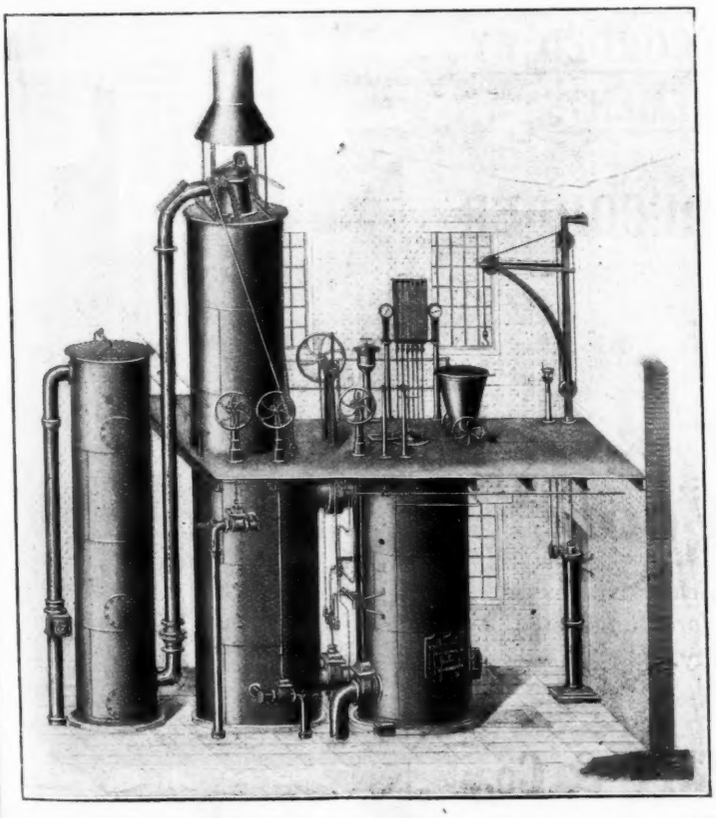
Fatality at the Carlisle Gas-Works.—A fatality in connection with the building of the new gas-works was the subject of an inquest at Carlisle, the victim being Edward Lawner, labourer, in the employ of the Simplex Concrete Pile Company, who was found dead in a water and airtight chamber prepared for the reception of tar and liquid. The chamber was being dried by means of open coke fires, and it was Lawner's duty to keep these fires burning. The post-mortem examination showed that death was due to asphyxiation by carbonic oxide poisoning, and a verdict of "Accidental death" was returned, the jury attaching no blame to anyone. Mr. H. H. C. Thomas, Inspector of Factories, stated that the class of work in which deceased was engaged was recognized by the Home Office as a dangerous occupation, in which every possible precaution should be taken. He advocated the use of smoke helmets by which fresh air could be obtained from the outside of a closed chamber such as this.

Harwich Capital Issue.—Messrs. A. & W. Richards, of No. 37, Walbrook, E.C., are, on the instructions of the Directors, offering for sale by tender 3000 £5 6 p.ct. irredeemable preference shares in the Harwich Gas and Coke Company, Ltd.; the minimum price of issue being par. The Company's business is steadily increasing; and the new capital is needed partly to pay off a temporary loan from the bankers for extensions, and partly to provide further new works. Tenders must reach Messrs. Richards by the morning of Tuesday, Oct. 3.

Gas Appliances Exhibition at Walsall.—With the object of making gas more popular, and so increasing the output from the Walsall Corporation works, an exhibition of gas stoves, fires, and various domestic appliances, promoted by the local Gas Committee, was held last week in the Walsall Town Hall, and was formally opened by the Mayor (Mr. Enoch Evans). Mr. H. H. Tucker (the Chairman of the Gas Committee) said much of the criticism levelled against the quality of gas was quite unnecessary. His watchword was "Cheap gas;" but it was important consumers should recognize that gas for illuminating purposes should be used with incandescent mantles, and not with flat-flame burners.

Assaulting a Gas-Works Foreman.—An assault by a labourer on his foreman at the Paignton Gas-Works resulted in the latter seeking the protection of the local Bench last Friday, where Thomas Banhay was summoned by Wm. Barnett for assault. Mr. W. P. Roberts, for complainant, said his client, who was works foreman for the Paignton Gas Company, had occasion to speak to defendant, who asked for his insurance card, saying that he was not going to stay in the yard to be "messed about." On Barnett trying to pacify him, Banhay struck him a violent blow on the arm and shoulder, as a result of which he had to remain away from work. Banhay said Barnett had threatened him with a pick shaft, but the Bench bound him over for six months in the sum of £5.

Dysynni Gas-Works Purchase Question.—There was another long discussion at a meeting of the Towyn and Aberdovey Council last week on the proposal to purchase the Dysynni Gas-Works at Towyn, which also supply Aberdovey. The question was raised by a motion in the name of Mr. Richard Jones, that the resolution passed at the May meeting to proceed to acquire the undertaking be rescinded, and that no further action be taken in the matter. Mr. Jones said the wording did not quite convey his meaning. He did not want to altogether exclude the idea of purchasing the works, provided they got them at a reasonable price; but he considered that the offered price of £8000, and the opposition of the ratepayers, did not justify them incurring any further expenditure at present. Mr. W. Jones Hughes said this matter had been on for many years, from the time of the old Local Board. They did not intend to give more than the value of the works. The £8000 was only a figure put forward by the Gas Company. Before they could form any idea of the value of the undertaking, they must get expert opinion, as they proposed to do. The motion to rescind was lost, and it was decided to secure a report on the works.



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Colwyn Bay Accounts.—The annual statement of accounts of the gas undertaking, which were presented at a meeting of the Lighting Committee of the Colwyn Bay Urban Council last week, showed a gross profit of £3526, and a loss of £3111 after paying interest on loan and redemption charges. The estimate for the current year, showing a gross profit of £14,136, and a net profit of £7595, was approved.

Nations' Food Exhibition to be Repeated.—A meeting of the principals of British and foreign firms now exhibiting at the Nations' Food Exhibition was held at Olympia last Friday, when it was unanimously decided to support a second similar exhibition to be held in September, 1924, also at Olympia. Several speakers stated that the exhibition which closed yesterday was the most successful they had ever been associated with. Both for magnitude of displays and attendance of the public the exhibition created records; but the next one will be half as large again, as it will occupy not only the main building, the annexe, and the galleries, but also the big extension to Olympia now in course of construction.

Lewes Gas Company.—The accounts presented at the half-yearly meeting showed the affairs of the Company to be in a satisfactory state. After providing for income-tax and interest on mortgages, the balance of net revenue was £1926, and the Directors recommended dividends for the six months at the rates of 3¾ p.ct. upon the original capital stock and 2⅝ p.ct. upon the additional capital stock. The Chairman (Mr. Edward Monk) said it had to be admitted there had been some curtailment in the sale of gas during the past half year, as compared with the corresponding period of 1921. There had been a considerable reduction in the amount expended upon coal. The revenue from the sale of residuals remained very low. The price charged for gas had been reduced from 8s. to 7s. 6d. per 1000 c.ft., and since the balance-sheet was prepared there had been a further reduction to 7s.

Relative Cost of Gas and Electricity at Hastings.—To an inquiry by a member of the Hastings Town Council as to the total number of public lamps in the borough lighted by electricity and by gas, and the respective cost of same, inclusive of maintenance, the Borough Accountant has given the following reply: Gas lighting: Year ended March 31, 1921, number of lamps, 632, cost £3492; year ended March 31, 1922, 623, £3750 (including £468 for fixing Sugg's conversion sets); year ended March 31, 1923, as estimated in February of this year, 619, £2795. Electric lighting: Year ended March 31, 1921, 1187, £5910; year ended March 31, 1922, 1231, £5801 (including £283 for adapting gas-lamps to electric light); year ended March 31, 1923, 1238, £7215 (including £1200 for adapting gas-lamps to electric light). The cost for the year ended March 31, 1923, does not include the additional sum of £500 for electric lighting included in the estimates not then considered by the Council. The figures given do not afford a uniform basis of comparison because of the following disturbing factors: (1) Reduction in the price of gas; (2) variation in hours during which the lamps were lighted; (3) reduction in cost of wages and materials.

Ebbw Vale without Gas.—Among the many misfortunes falling upon the town in consequence of the closing-down of the Ebbw Vale Company's works, is the deprivation of a gas supply, through the stopping of the coking plant. The lighting of the public streets will not be affected, as this is done electrically.

Blackpool Gas Output.—From April 1 to Sept. 20 the output of the Blackpool Corporation works was 403,377,000 c.ft., an increase of more than 7¼ millions (1·93 p.ct.) over the corresponding period of 1921. Last year over 49,000 tons of coal and 262,706 gallons of oil were used at the works, according to a report just issued, while 828,005,000 c.ft. of gas were made. The residuals sold included 17,209 tons of coke and 2840 tons of tar. The gas-mains total 128¼ miles in length, and the consumers number 19,309, including 4375 prepayment meters.

Price and Quality of Gas at Aldershot.—A general reduction in the price of gas of 2d. per therm as from Christmas next is to be made by the Aldershot Gas, Water, and District Lighting Company. When this new rate comes into operation, it will mean that there will have been a reduction equivalent to 1s. 3d. per 1000 c.ft. since Midsummer of last year, and in the area which includes Farnborough, Camberley, Fleet, Frimley, &c., the reduction will be 1s. 6d. per 1000 c.ft. These reductions represent about £30,000 per annum saving to the public. The Company have also been dealing with a complaint from the Aldershot Trades Council as to the quality of the gas; and in regard to this they point out that the certified tests since January have been as follows: Jan. 1 to March 31, 510 B.Th.U.; April 1 to June 30, 517·6 B.Th.U.; and July 1 to date, 514·9 B.Th.U.

Low-Temperature Carbonization, Ltd., state that engineers sent over by the French Government are now on a visit of investigation to their "coalite" smokeless fuel works at Barnsley, with a view to erecting similar plants in the Sarre Valley.

In consequence of the disastrous fire at their Glasgow mantle factory (reported in the last issue of the "JOURNAL"), Messrs. Falk, Stadelmann, and Co. have opened temporary offices and showrooms at Nos. 19-21, York Street, Glasgow, where orders will be dealt with promptly through the medium of the firm's London works.

The purifier oxide storage department at the Bolton Gas-Works took fire last Thursday, but the brigade prevented the flames reaching a tar-tank in the same building. Nothing is known as to the cause of the outbreak, which might have been due to a spark falling on the roof or to spontaneous ignition of the material. The damage was not considerable.

At the busiest hour on Saturday evening, much inconvenience was caused in Sunderland by a break-down at the electric power station. In addition to the failure of the lighting, cars on all routes were held up. After nearly three-quarters of an hour, the street-lamps were again lighted; but the power to drive the cars was not resumed for nearly two hours.

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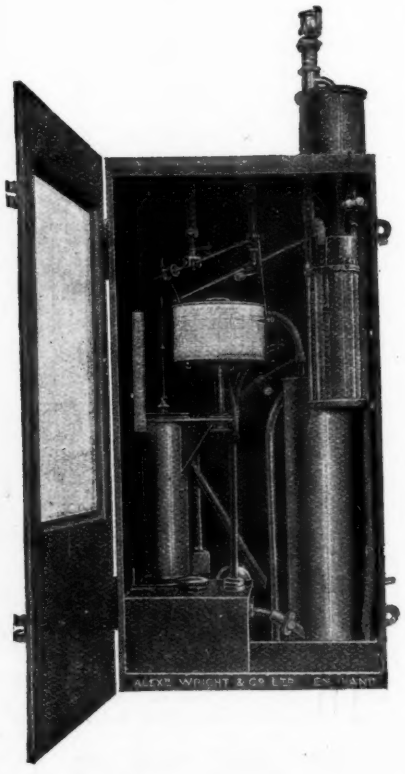

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STOCK MARKET REPORT.

THE week just closed on the Stock Exchange opened very gloomily. There was a big drop in prices all round from the choicest gilt-edged magnates down to the humble classes. A better feeling ruled for the next two days, and a rally set in. This was clashed next day by big Continental sales; and the week closed a prey to doubts and fears. The big four survived. Friday's figures were: Consols 56⅝-57, War Loan 99½-99¾, Funding 86⅜-87⅛, Victory 87 7/32-88 5/16.

Business in the Gas Market was not interrupted, and there was a fairly average array of transactions. There were movements both ways; but the tone on the whole was not unsatisfactory. In the London Companies, Gas Light ordinary and debenture and South Metropolitan were 1 lower; in the Suburban and Provincial group, Brentford "A" and "B" rose 1½ each, British 1, Hastings and St. Leonards 5 p.ct. 2½ and ditto 3½ p.ct. 1¾, but Newcastles had a slight fall. In Foreign, Imperial Continental was steady; but European fell 1, Monte Video fell 1, and Primitiva debenture 2.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S TRANSACTIONS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Transactions.
£			p.c.					
182,049	Stk.	Aug. 24	4	4%	Aldershot 4 p.c. Pref.	..	68—73	70
1,551,868	,,	Apl. 12	2½	3 3/16%	Alliance & Dublin Ord.	59—64	62—67	64½
374,000	,,	July 13	4	4%	Do. 4 p.c. Deb.	76—79	60—65	64½
280,000	5	May 18	7½	4/-	Bombay, Ltd.	5½—6½	4½—5½	4½
100,000	5	Aug. 10	16	7½%	Bournemouth Gas and Water { 5 p.c.	..	11—12	11½
383,110	10	,,	7	7%	{ B 7 p.c.	15—15½	10½—11½	11
115,000	10	,,	6	6%	{ Pref. 6 p.c.	13½—14	8—9	...
162,065	—	June 29	—	4%	{ 4 p.c. Deb.	..	73—78	...
992,045	Stk.	July 27	14	6t/-	Brentford A Consolid.	261—266	98—102	...
734,920	,,	,,	11	6t/3	Do. B New	204—209	98—102	...
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	82—87	...
221,400	,,	June 15	4	4%	Do. 4 p.c. Deb.	91—93	75—80	...
214,775	,,	Aug. 24	11	11%	Brighton & Hove Orig.	208—213	165—170	168½—169½
244,200	,,	,,	8	8½%	Do. A Ord. Stk.	154—159	120—125	123½—124½
1,287,500	Stk.	July 28	5	5%	Bristol 5 p.c. max.	..	..	...
530,000	20	Mch. 15	12½	10%	British	44—45	31—33	32
120,000	Stk.	June 29	4	4%	Do. 4 p.c. Deb. Stk.	88—90	75—80	...
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	53—58	...
100,000	10	June 1	—	7%	Cape Town & Dis., Ltd.	1½—2½	6½—7½	...
100,000	10	Apl. 27	—	4½%	Do. 4½ p.c. Pref.	4—6	6½—7½	6½—7
100,000	Stk.	June 29	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	73—78	...
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	..	...
1,513,280	,,	July 27	5/9/4	56/-	Commercial 4 p.c. Stk.	106—108	93—98	91½—95½
560,000	,,	,,	5½	55/-	Do. 3½ p.c. do.	103—105	93—98	...
475,000	,,	June 15	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	55—60	57½
800,000	,,	Dec. 15	4	—	Continental Union, Ltd.	76—79	29—34	...
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	55—60	...
51,600	,,	Feb. 23	15	15%	Croydon A 10 p.c.	..	..	...
278,400	—	,,	12	12%	Croydon B and C 7 p.c.	..	..	...
492,270	Stk.	—	6	4½%	Derby Con. Stk.	123—125	80	...
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	65	...
1,002,180	10	July 13	10	5/0	European, Ltd.	17½—18	10½—11½	10½—11½
16,298,975	Stk.	July 27	4/17/4	52/-	Gas Light and Coke { 4 p.c. Ord.	98—102	92—94	92—93¾
2,600,000	,,	,,	3½	35/-	{ 3½ p.c. max.	76—79	61—64	62—62½
4,062,235	,,	,,	4	4%	{ 4 p.c. Con. Pref.	96—99	79—82	79½
4,674,850	,,	June 15	3	3%	{ 3 p.c. Con. Deb.	72½—74½	61—64	61—62½
130,000	,,	Dec. 11	10	10%	{ 10 p.c. Bonds	..	..	183½—184½
82,500	,,	Sept. 21	5	65/7½	Hastings & St. L. 5 p.c.	..	95—100*	99—99½
258,740	,,	,,	3½	50/7½	Do. 3½ p.c.	87—89	73—78*	73½
70,000	10	May 18	11	7½%	Hongkong & China, Ltd.	16½—16½	6—7	...
86,600	Stk.	Aug. 24	9	9½%	Hornsey 7 p.c.	..	127—132	...
131,000	,,	Aug. 10	7½	7½%	Ilford A and C	151—154	..	...
65,780	,,	,,	6½	5½%	Do. B.	115—118	..	...
65,500	,,	June 29	4	4%	Do. 4 p.c. Deb.	92—94	..	...
1,976,000	,,	May 18	9	10%	Imperial Continental	150—160	155—160	150—160
404,800	,,	Aug. 10	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	70—75	70—72
235,242	,,	July 27	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	95—100	...
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord. { A.	211—213	..	...
					{ B.	146—148	..	...
306,083	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	..	...
165,736	,	Aug. 10	7/5/6	87/3	Maidstone 5 p.c.	..	87—92	...
63,480	,,	June 29	—	3%	Do. 3 p.c. Deb	..	54—59	...
75,000	5	,,	6	6%	Malta & Mediterranean	4½—4½	3½—3½	...
250,000	100	Apl. 3	4½	4½%	Met. of Melbourne { 4½ p.c. Deb.	99—101	97—98	...
541,920	Stk.	June 1	4	4%	Monte Video, Ltd.	11½—12	62—67	62½
1,875,892	,,	July 27	4½	4½%	Newcastle & Gatsh'dCon.	98½—99½	78—80	79½
529,705	,,	June 29	3½	3½%	Do. 3½ p.c. Deb.	82—83	67—69	67½
15,000	10	Aug. 26	—	7/6	North Middlesex 10 p.c.	..	12½—13	...
55,940	10	Aug. 24	7/14/0	7/8⅞	,, ,, 7 p.c.	14—15	10½—11½	...
300,000	Stk.	May 18	8	8%	Oriental, Ltd.	117—122	92—97	93
60,000	5	—	10	—	Ottoman, Ltd.	7½—7½	2—3	...
188,120	Stk.	June 29	—	6/3/9%	Plym'th & Stonh'se 5 p.c.	..	93—98	...
60,000	50	Aug. 24	13	65/-	Portsea Island, B	128—131	100—105	...
100,000	50	,,	12	60/-	Do. C	118—121	85—90	...
249,980	5	—	8	—	Primitiva Ord.	5½—6	⅝—¾	13/6—14/6
499,960	5	—	5	—	Do. 5 p.c. Pref.	4½—5	1½—2½	38/9
521,600	100	June 1	4	4%	Do. 4 p.c. Deb.	91—93	68—73	68
600,000	Stk.	July 27	4	4%	Do. ,, ,, 1911	..	55—60	...
346,198	,,	June 29	4	4%	River Plate 4 p.c. Deb.	85—87	53—58	...
150,000	10	Sept. 21	6	6/-	San Paulo { 6 p.c. Pref.	10½—11	5½—6*	...
125,000	50	July 3	5	5%	{ 5 p.c. Deb.	47—49	35—38	...
135,000	Stk.	Aug. 24	10	5%	Sheffield A	223—224	95—97	...
209,984	,,	,,	10	5%	Do. B	222—224	95—97	...
523,500	,,	,,	10	5%	Do. C	220—222	95—97	...
133,201	Stk.	Sept. 15	4	4%	Shrewsbury 5 p.c.	..	..	...
90,000	10	June 29	9	7½%	South African	10½—11½	7—9	...
6,609,895	Stk.	July 27	5/4/0	5%	South Met. Ord.	111—113	93—96	93½—95
250,000	,,	July 13	—	5%	Do. Red. Pref.	..	94—96	...
1,895,445	,,	,,	3	3%	Do. 3 p.c. Deb.	72½—74½	61—64	62—63½
224,820	,,	Aug. 24	8½	8½%	South Shields Con. Stk.	157—159	106—108	...
1,087,795	,,	,,	6	6%	S'th Suburb'n Ord. 5 p.c.	114—116	97—100	97—99
368,837	,,	June 15	5	5%	Do. 5 p.c. Deb. Stk.	116—118	95—100	...
647,740	,,	May 18	5	5%	Southampton Ord.	99—102	75—80	...
121,275	,,	June 29	4	4%	Do. 4 p.c. Deb. Stk.	..	63—68	...
120,000	,,	July 27	—	7½%	Tottenham { A 5 p.c.	135—138	110—115	...
782,275	,,	,,	6	6%	District { B 3½ p.c.	115—117	97—102	...
181,255	,,	June 15	4	4%	{ 4 p.c. Deb.	87—89	75—80	76
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	⅛—¼	2/6
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	20—30	20
236,476	Stk.	Aug. 24	5	2½%	Tynemouth 5 p.c. max.	108½—109	73—75	...
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	July 27	8½	72/6	Wandsworth A 5 p.c.	151—156	111—115	114
255,636	,,	,,	6½	57/6	Do. B 3½ p.c.	129—134	95—100	100
108,075	,,	,,	—	50/9	Do. C	..	85—90	...
140,865	,,	,,	—	50/9	New Ordinary	..	85—90	...
352,000	,,	,,	6½	53/9	Wimbledon 5 p.c.	117—122	95—100	...
98,000	,,	,,	6½	58/9	Epsom 5 p.c.	121—126	95—100	99—99½
88,416	,,	June 29	3	3%	3 p.c Deb. Stk.	66—69	57—60	...

* Ex Div.

The following transactions in gas during the week were recorded: On Monday, Aldershot 4 p.ct. preference 70, Alliance and Dublin ordinary 64½, ditto 4 p.ct. debenture 64⅜, Commercial 4 p.ct. 94½, ditto 3 p.ct. debenture 57½, Gas Light ordinary 92½, 93, 93¼, 93⅜, ditto maximum 62, ditto preference 79⅜, ditto 3 p.ct. debenture 61, Hastings and St. Leonards 3½ p.ct. 73½, Imperial Continental 150, 150½, 151, 152, 155, 158, 160, Newcastle Con. 79½, Oriental 95, Primitiva 13s. 6d., South Metropolitan 95, ditto 3 p.ct. debenture 62, South Suburban 99, Brighton and Hove 6 p.ct. preference "B" 100, British (Norwich) 3 p.ct. debenture 54½, Hampton Court 5 p.ct. 99½, 100, Tottenham 5 p.ct. preference 90, Uxbridge and Wycombe 5 p.ct. 85, 85½. On Tuesday, Brighton and Hove original 168½, ditto "A" 123½, British 32, Commercial 3 p.ct. debenture 57½, European 11½, Gas Light ordinary 92, 92½, 93¼, ditto maximum 62, Imperial Continental 153½, ditto 3½ p.ct. debenture 70, Primitiva ordinary 13s. 6d., ditto preference 38s. 9d., South Metropolitan 94, 94½, 94⅝, Tuscan 2s. 6d., South Metropolitan 6½ p.ct. debenture 105⅜. On Wednesday, Brighton and Hove original 169½, ditto ordinary 124½, Commercial 4 p.ct 94½, 95½, European 11, Gas Light ordinary 92½, 92½, 92⅜, 93, 93½, ditto 3 p.ct. debenture 62⅜, ditto 10 p.ct. bonds 183½, 184½, Imperial Continental 150, 155, ditto 3½ p.ct. debenture 72, Monte Video 62½, Primitiva 4 p.ct. debenture 68, South Metropolitan 94, ditto 3 p.ct. debenture 63½, ditto 6½ p.ct. debenture 104½, 105⅜, South Suburban 97, Tottenham 4 p.ct. debenture 76, Tuscan 5 p.ct. debenture 20, Wandsworth "A" 114, ditto "B" 100, ditto Epsom 99½, Swansea 7 p.ct. preference 103, 103½, Wrexham 5 p.ct. 59⅜. On Thursday, Bombay 4⅞, Commercial 4 p.ct. 94½, European 10½, 10⅜, Gas Light ordinary 93, 93½, 93⅜, Hastings and St. Leonards 5 p.ct. 99, 99½, Imperial Continental 155, 157, 160, Newcastle 3½ p.ct. debenture 67⅜, Oriental 95, South Metropolitan 93½, 94½, ditto 3 p.ct. debenture 62½, 62½, Lea Bridge 7 p.ct. debenture 103½. On Friday, Bournemouth "A" 11⅝, ditto "B" 11, Cape Town preference 6 15/16, 7, Commercial 4 p.ct. 95, 95½, Gas Light ordinary 92½, 92⅞, 93, 93⅛, 93¼, 93½, ditto maximum 62⅜, Hastings and St. Leonards 99, 99½, Imperial Continental 155, 158, 159, 160, Primitiva ordinary 14s. 6d., South Metropolitan 93½, 93⅝, 94, Brighton and Hove 4 p.ct. debenture 72½, ditto 5 p.ct. debenture 90½, Hampton Court 5 p.ct. 99½, 100.

In the Money Market, there was nothing to cause any agitation or anxiety, and the prevailing tone was easy. About midweek a better demand made its appearance; but there was no approach to serious tightness, and it subsided later. Discount rates were hardly varied, and ruled generally steady throughout the week. Silver was fairly steady. The Bank of England rate was 3 p.ct., as fixed on July 13.

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